**Chapter 6: ENDOCRINE SYSTEM**
**Updated: May 2025**

**The following prescribing guidelines are relevant to the endocrine chapter and can be found here**

- Cinacalcet prescribing and monitoring
- Diabetes- Blood Glucose and ketone meters, testing strips and lancets formulary
- Diabetes- JAPC briefing for FreeStyle Libre/Dexcom ONE
- Diabetes- type 2- management in adults
- Diabetes Glucose Monitoring – interim position statement
- Finerenone prescribing guidance for primary care
- Hyperprolactinaemia (cabergoline & quinagolide)
- Liothyronine- position statement
- Menopause- local management guideline
- Osteoporosis- diagnosis & management/ bisphosphonate treatment break

Relevant resources:

- Transgender and Non-Binary Adults - Primary Care guidance
- Trans healthcare - Advice based on GMC guidance
- Gender incongruence in primary care - Advice from BMA
- Nottingham Centre for Transgender Health
- New government restrictions on use of puberty suppressing hormones – Information for prescribers and pharmacists/dispensing doctors
- Exogenous steroids, adrenal insufficiency and adrenal crisis - Society for Endocrinology advice
- Implementing the steroid card safety advice- PrescQIPP resource
- Steroid emergency card to support early recognition and treatment for adrenal crisis in adults

## 6.1 Drugs used in diabetes

### 6.1.1 Insulins

***Insulins should be prescribed by brand as they are not interchangeable.***

In patients requiring insulin, where a biosimilar is available, the most cost-effective preparation should be chosen. Make a shared decision with the person after discussing their preferences.

Adult patients on insulin should receive an insulin passport (https://pcse.england.nhs.uk/services/supplies to order supplies)provide accurate identification of their current insulin therapy across healthcare sectors. Errors in the administration of insulin are common, and consequence may be severe and can cause death. All insulin doses should be measured and administered using an insulin syringe or commercial insulin pen device, and the term 'units' should always be used in full without abbreviating. NHS PSA November 2016: **DO NOT** use insulin needle and syringe to administer insulin withdrawn directly from a pen device or replacement cartridge due to risk of severe harm and death.

MHRA April 2013: Patients should be trained on how to use their insulin device, and for patients using high strength preparations, particularly on how to check the dose displayed on the prefilled pen. MHRA April 2015: Care should be taken when prescribing high strength, fixed combination and biosimilar products- prescriber and patients must understand the insulin strength of products and how to use them correctly to minimise the risk of medication errors.

MHRA Sept 2020 Injection of insulin (all types) can lead to deposits of amyloid protein under the skin (cutaneous amyloidosis) at the injection site which interferes with insulin absorption thus it is important to rotate injection site. There is a risk of hypoglycaemia in patients that suddenly change injection site from an area with cutaneous amyloidosis to an unaffected area (for example, changing the injection site from the torso to the leg). Patients should therefore carefully monitor blood glucose after changing injection site and consider adjusting the dose of insulin or antidiabetic medication to avoid hypoglycaemia, as needed.

**Insupen original** (4mm/32/33g, 5mm/31g, 6mm/31/32g; **GlucoRx Carepoint pen needles** (4mm/31g, 5mm/31g, 6mm/31g) and **GlucoRx Carepoint Ultra** (4mm/32g) are the formulary choice of insulin pen needles. If this is unsuitable consider other brands costing less than £5 per 100 needles.
All other insulin pen needles with acquisition cost > £5 per 100 are classified as **Do Not Prescribe (DNP)**.

Safety needles should NOT be used by patients who self-administer insulin. If safety needles are indicated GlucoRx Safety Pen Needle (5mm/30g) is the preferred brand. If this is unsuitable consider other safety needles with an acquisition cost <£20 per 100. All other insulin safety needles with acquisition cost > £20 per 100 are classified as **Do Not Prescribe (DNP).**

| | **Insulin** (100units/ml) | **Notes** | **Timing of injection** | **Onset of action** | **Peak** | **Duration of action** |
|---|---|---|---|---|---|---|
| **Mealtime insulins** | **Short-acting human insulins** | | | | | |
| | **Actrapid** (soluble insulin) | GREEN | Within 30 mins before meal | Within 30 mins | 1.5-3.5 hrs | 7-8 hrs |
| | **Humulin S** (soluble insulin) | GREEN | Within 30 mins before meal | 30min-1h | 1-6 hrs | 6-12 hrs |
| | **Rapid-acting analogues** *Preferred option for type 1 diabetes (NG17)* | | | | | |
| | Insulin aspart & biosimilar | | | | | |
| | **Trurapi** (insulin aspart biosimilar) | GREEN - *Preferred cost-effective brand.* | Immediately before meal | 10-20 mins | 1-3 hrs | 3-5 hrs |
| | **Novo Rapid** (insulin aspart) | GREY – *For existing patients only where a switch to a cost-effective biosimilar is not possible or appropriate.* | Immediately before meal | 10-20 mins | 1-3 hrs | 3-5 hrs |
| | **Fiasp** (insulin aspart) | GREEN - *Specialist recommendation. An option for type 1 diabetes (NG17) in new adult patients.* | Within 0-15 mins of meal | 4 mins | 1-3 hrs | 3-5 hrs |
| | Insulin lispro & biosimilar | | | | | |
| | **Admelog** (insulin lispro biosimilar) | GREEN - *Preferred cost-effective brand* | Within 0-15 mins of meal | 15 mins | 1.5hr | 2-5 hrs |
| | **Humalog*** (insulin lispro) | GREY- *For existing patients only where a switch to a cost-effective biosimilar is not possible or appropriate.* | Within 0-15 mins of meal | 15 mins | 1.5hr | 2-5 hrs |
| | **Lyumjev*** (insulin lispro) | GREEN - *Slightly different releasing profile – used in adults in whom a more rapid acting mealtime insulin is desirable.* | Up to 2min before or 20min after starting meal | 20min | 1-3 hrs | 5 hrs |
| | Insulin glulisine | | | | | |
| | **Apidra** (insulin glulisine) | GREEN | Within 0-15 mins of meal | 10-20 mins | 55min | 1.5-4 hrs |
| **Basal insulins** | **Intermediate-acting human insulin (NPH)** *first line for most patients with type 2 diabetes* | | | | | |
| | **Insulatard** (isophane (NPH) insulin) | GREEN | At bedtime or 12 hourly | Within 1.5 hrs | 4 -12 hrs | 24 hrs |
| | **Humulin I** (isophane (NPH) insulin) | GREEN | At bedtime or 12 hourly | 30min-1hr | 1-8 hrs | 22 hrs |
| | **Long-acting analogues** | | | | | |
| | **Levemir** (insulin detemir) | GREEN - *preferred choice for adult type 1 diabetes (NG17),* ***Discontinued but supplies are expected to last until the end of 2026*** | Once/twice daily | 0.5-1 hr | 3-14 hrs | Up to 24 hrs |
| | Insulin glargine & biosimilar | | | | | |
| | **Semglee** (insulin glargine biosimilar) | GREEN - *Preferred cost-effective brand* | Once daily | 0.5-1 hr | No peak | Up to 24 hrs |
| | **Lantus** (insulin glargine) | GREEN 2nd line - *for patients needing cartridge/ vial. For existing patients only where a switch to a cost-effective biosimilar is not possible or appropriate.* | Once daily | 0.5-1 hr | No peak | Up to 24 hrs |
| | **Abasaglar** (insulin glargine biosimilar) | GREY - *New patient should consider Semglee as the cost-effective brand.* | Once daily | 0.5-1 hr | No peak | Up to 24 hrs |
| | Insulin degludec | | | | | |
| | **Tresiba*** (insulin degludec) | GREY consultant/specialist initiation - *restricted to those with documented nocturnal hypoglycaemia or loss of hypoglycaemia awareness despite using long-acting insulin analogue, who would otherwise have been started on an insulin pump in type 1 diabetes; or for people who need help from a carer or healthcare professional to administer injections (NG17)* | Once daily | 0.5 –1.5 hrs | No peak | >42 hrs |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Biphasic insulins** | **Pre-mixed human insulin** *(commonly used in twice daily regimens in type 2 diabetes)* | | | | | |
| | Biphasic isophane insulin<br>**Humulin M3** (soluble insulin 30%+isophane insulin 70%;) | | Within 30 mins before meal | Within 30 mins | 2 and 8hrs | Up to 24hrs |
| | **Pre-mixed analogues** *(an option in type 2 diabetes if a person prefers to inject insulin immediately before a meal)* | | | | | |
| | Biphasic insulin aspart GREEN<br>**Novomix 30** (insulin aspart 30%+ insulin aspart protamine 70%) | | Within 0-10 mins of meal | Within 10-20 mins | 1-4 hrs | up to 24hrs |
| | Biphasic insulin lispro GREEN<br>**Humalog Mix 25** (insulin lispro 25%+insulin lispro protamine75%)<br>**Humalog Mix 50**(insulin lispro 50%+insulin lispro protamine 50%) | | Within 0-15 mins of meal | About 15 mins | About 2 hrs | up to 24hrs |

* higher strength preparation also exist- see table below.

**High strength insulins**

| Insulin/strength | Traffic light status | Timing of injection | Onset of action | Peak | Duration of action |
|---|---|---|---|---|---|
| **Rapid-acting analogues** (meal time insulin) | | | | | |
| **Humalog** (Insulin lispro 200units/ml) | Grey. See MHRA April 2015, High strength, fixed combination and biosimilar insulin products to minimise the risk of medication error. | Within 0-15 mins of meal | 15 mins | 1.5hr | 2-5 hrs |
| **Lyumjev** (insulin lispro 200units/ml) | Grey. See MHRA April 2015, High strength, fixed combination and biosimilar insulin products to minimise the risk of medication error. | Up to 2min before or 20min after starting meal | 20min | 1-3 hrs | 5 hrs |
| **Long-acting analogues** (basal insulin) | | | | | |
| **Toujeo** (Insulin glargine 300units/ml) | GREY after consultant/specialist recommendation:<br>• for patients on insulin Degludec or<br>• for patients being considered for insulin pump therapy or<br>• for patients currently on high dose of insulin (>150units/day) who would otherwise have been started with Humulin R U-500 or degludec. | Once daily | 0.5-1 hr | No peak | 24-36 hrs |
| **Tresiba** (Insulin degludec 200units/ml) | GREY after consultant/specialist initiation for patients currently on high dose of insulin (>150units/day) after consideration of Toujeo. | Once daily | 0.5 –1.5 hrs | No peak | >42 hrs |

1. In a meta-analysis, short-acting insulin analogues for type 2 diabetes did not improve HbA1c, hypoglycaemia, or quality of life, compared with conventional human insulin. JAPC has agreed that insulin analogues in type 2 diabetes are overused and should be considered after conventional human insulin.
2. Human Neutral Protamine Hagedorn (NPH) insulin is preferred; however, long-acting analogues can be considered as an alternative in type 2 diabetes if:
   - the person needs assistance from a carer or healthcare professional to inject insulin and use of detemir or glargine (ensure glargine prescribed as brand name) 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.
3. NICE NG17 recommends patients with type 1 diabetes should usually be offered two insulins that act in different ways:
   - a background (also known as a 'basal' or 'long acting') insulin ideally injected twice a day (insulin detemir) **AND**
   - a 'quick-acting' (also known as a 'bolus' or 'rapid-acting') insulin injected before each meal to deal with the rise in blood glucose from eating.
4. InsuJet the needle free insulin device is classified as **Do Not Prescribe (DNP).**

| Insulin type | Active substance | Brand name | Strength | Cartridge (5x3ml) cost | Pre-filled pen (5x 3ml) cost | Vial (10ml) cost | Cost per 100 unit |
|---|---|---|---|---|---|---|---|
| Intermediate (NPH) human insulin | **Isophane (NPH) insulin** | Humulin I | 100units/ml | £19.08 | £21.70 | £15.68 | £1.27 - £1.57 |
| | | Insulatard | 100units/ml | £22.90 | -- | £7.48 | £0.75 - £1.53 |
| Long-acting analogues | **Insulin glargine (and biosimilar)** | Semglee | 100units/ml | -- | £29.99 | -- | £1.99 |
| | | Lantus | 100units/ml | £34.75 | £34.75 | £25.69 | £2.32 - £2.57 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Long-acting analogues | | Abasaglar | 100units/ml | £35.28 | £35.28 | -- | £2.35 |
| | **Insulin detemir** | Levemir | 100units/ml | £42.00 | £42.00 | -- | £2.80 |
| | **Insulin glargine** | Toujeo | 300units/ml | -- | £32.14 (3x1.5ml) £64.27 (3x 3ml) | -- | £2.38 |
| | **Insulin degludec** | Tresiba | 100units/ml | £46.60 | £46.60 | -- | £3.10 |
| | | | 200units/ml | -- | £55.92 (3 x 3ml) | -- | £3.10 |

NPH and insulin analogue products and cost comparisons
Price as per MIMs March 2025

Insulin pen price comparisons

| Name | Cartridge size | Price (£) |
|---|---|---|
| Autopen 24 | 3ml | 17.93 |
| Autopen classic | 3ml | 18.20 |
| AllStar Pro | 3ml | 25.00 |
| JuniorSTAR | 3ml | 26.00 |
| NovoPen6 | 3ml | 26.86 |
| NovoPen Echo Plus | 3ml | 26.86 |
| HumaPen Savvio | 3ml | 27.01 |

Price as per MIMs May 2025

### 6.1.2 Antidiabetic drugs

**See local type 2 diabetes guideline.**

A HbA1c reduction of at least 5 mmol/mol (0.5%) is considered clinically significant. At each review re-assess the person's needs and circumstances and think about stopping any medicines that are not effective at 6 months.

**Metformin** tabs 500mg, 850mg
**Metformin SR** tabs 500mg, 750mg, 1000mg

1. Metformin is the first-line oral hypoglycaemic for all people with type 2 diabetes (unless contraindicated). To be taken with meals start low and go slow. For example, start metformin at 500mg od with main meal. After 1 week, increase to 500mg bd. Then increase in 500mg steps at weekly intervals to highest dose tolerated or maximum dose reached. The maximum recommended dose of metformin is now **2g/day** and higher doses give a high risk of B12 deficiency for minimal benefit
2. Metformin SR should be restricted for use in those patients who are intolerant of standard release metformin, even after slow dose titration. Try metformin SR before switching to an alternative hypoglycaemic agent.
3. Metformin oral powder sachet sugar free (SF) is more cost-effective than oral solution for patients with swallowing difficulty.
4. The risk of lactic acidosis with metformin, especially if creatinine clearance is above 30ml/min, is very minimal. NICE advises to review the dose of metformin if the serum creatinine exceeds 130 micromol/litre or the estimated glomerular filtration rate (eGFR) is below 45 ml/minute/1.73-$m^2$, and to **stop the metformin if the serum creatinine exceeds 150 micromol/litre or the eGFR is below 30 ml/minute/1.73-$m^2$**.
5. NICE PH38 – type 2 diabetes-prevention in people at high risk, recommends clinicians use their judgement on whether (and when) to offer metformin to support lifestyle change for people whose HbA1c or fasting plasma glucose blood test results have deteriorated if
   - This has happened despite their participation in intensive lifestyle-change programmes, or they are unable to participate in an intensive lifestyle-change programme, particularly if they have a BMI greater than 35.
   - High risk patients are defined as HbA1c of 42-47mmol/mol (6.0-6.4%) or fasting plasma glucose of 5.5-6.9mmol/l
   - Metformin should be prescribed for 6–12 months initially. Monitor the person's fasting plasma glucose or HbA1c levels at 3-month intervals and stop the drug if no effect is seen.
6. MHRA June 2022:**Metformin and reduced vitamin B12 levels -** Decreased vitamin B12 levels, or vitamin B12 deficiency, is now considered to be a common side effect in patients on metformin treatment, especially in those receiving a higher dose or longer treatment duration and in those with existing risk factors. See also shared care pathology.

   Local advice:
   - For patients existing on dose >2g/day- reduce dose to 2g a day and consider checking B12 level at the same time.

- Patients presenting with symptoms of B12 deficiency should be offered a B12 test. Symptoms include neuropathy symptoms (pins and needles/tingling especially of the feet), glossitis (painful swollen tongue) or a macrocytic anaemia (low Hb with raised MCV). Many people with neuropathy due to low B12 do not have anaemia so a normal FBC does not rule out a low B12.
- A low B12 in a patient on metformin is likely to be multifactorial hence the advice is to replace B12 rather than stop the metformin.

Sodium glucose co-transporter 2 (SGLT2) inhibitors
**Dapagliflozin** tabs 5mg, 10mg
**Empagliflozin** tabs 10mg, 25mg

| **Indication** | **Dapagliflozin** | **Empagliflozin** | **Canagliflozin** |
|---|---|---|---|
| **strength** | tabs 5mg, 10mg | tabs 10mg, 25mg | tabs 100mg, 300mg |
| Type 2 diabetes without CKD See local guidance. | **GREEN** preferred SGLT2i (NICE TA288 & TA390 & TA418) | **GREEN** preferred SGLT2i (NICE TA336 & TA390) | **GREY**- exceptionality defined as intolerance to the preferred 1st line choice or restricted by their licensing (NICE TA315 & TA390) |
| Type 2 diabetes + CKD | **GREEN** (NICE TA775) | **GREEN** (NICE NG28 & NG203) | **GREY** (NICE NG28 & NG203) |
| Chronic Kidney Disease | **GREEN** (NICE TA775) | **GREEN** (NICE TA942) | - |
| Chronic heart failure with reduced ejection fraction | **GREEN** specialist initiation & stabilisation (NICE TA679) see heart failure guideline | **GREEN** specialist initiation & stabilisation (NICE TA679) see heart failure guideline | - |
| Chronic heart failure with preserved or mildly reduced ejection fraction | **GREEN** specialist recommendation (NICE TA902) | **GREEN** specialist recommendation (NICE TA929) | - |
| With insulin for treating Type 1 diabetes | **RED** unlicensed indication | - | - |

1. NICE NG28 type 2 diabetes in adults guideline (updated June 2022) recommends: based on the cardiovascular risk assessment for the person with type 2 diabetes
   - If they have chronic heart failure or established atherosclerotic cardiovascular disease, **offer** an SGLT2 inhibitor with proven cardiovascular benefit in addition to metformin.
   - If they are at high risk of developing cardiovascular disease, **consider** an SGLT2 inhibitor with proven cardiovascular benefit in addition to metformin.
2. Before commencing an SGLT2i check risk of DKA and educate the patient about sick day rules. See medicines and your kidneys leaflet and type 2 diabetes guideline.
3. SGLT2 inhibitors used in type 2 diabetes may lead to ketoacidosis. Inform patients to seek immediate medical advice if they have signs and symptoms of DKA e.g., 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. Diagnosed. MHRA April 2016 states Test for raised ketones in patients with signs and symptoms of DKA and stop SGLT2 inhibitor treatment immediately if DKA suspected.
4. MHRA March 2020: SGLT2 inhibitor treatment should be interrupted in patients who are hospitalised for major surgical procedures or acute serious medical illnesses and ketone levels measured.
5. SGLT2 inhibitors: reports of Fournier's gangrene (necrotising fasciitis of the genitalia or perineum). Rare but potentially life-threatening infection that requires urgent medical attention. MHRA February 2019.
6. Canagliflozin may increase the risk of lower-limb amputation in patients with type 2 diabetes (MHRA June 2016). Evidence does not show an increased risk for dapagliflozin and empagliflozin, but the risk may be a class effect.
7. The combination products dapagliflozin and metformin (Xigduo), canagliflozin and metformin (Vokanamet) and empagliflozin and metformin (Synjardy) have been classified as **GREY**. The combination products are cheaper than the separate components and may aid compliance; however, they are limited by the inability to increase to the target metformin dose.

Sulfonylureas
**Gliclazide** tabs 80mg

1. Other strengths and formulations of gliclazide are available but are less cost effective so are not routinely recommended.
2. Gliclazide MR is **GREY** for patients with compliance problems requiring once daily dosing. Prescribe as 30mg MR tablets as more cost effective.

DPP-4 inhibitors (gliptins)

**Sitagliptin tabs** 25mg, 50mg, 100mg *preferred 1st line DPP-4 inhibitor, see renal and hepatic table in type 2 diabetes guidance.*

1. A review by MTRAC concluded that no significant differences were reported between the DPP-4 inhibitors with respect to blood-glucose lowering efficacy against other oral diabetic treatments.
2. Alogliptin, linagliptin, saxagliptin, and vildagliptin have been classified as **GREY** by exceptionality defined as intolerance to the preferred choices or restricted by their licensing.
3. DPP4i should only be continued if there is a reduction of ≥5.5mmol/mol in HbA1c in 6 months.
4. Patients treated with DPP-4 inhibitors should report any persistent, severe abdominal pain (sometimes radiating to the back). MHRA Sept 2012: Discontinue DPP-4 inhibitor if pancreatitis is suspected. DPP-4 inhibitors may also cause joint pain that can be severe and disabling, discontinuation of therapy with this class of drugs if severe and persistent joint pain occurs (FDA Aug 2015).
5. Janumet (Sitagliptin & Metformin) has a limited place in therapy where a combination product is indicated, e.g. to aid compliance. The combination product is cheaper than the separate components, however it is limited by it's inability to increase the target metformin dose.

Glucagon-like Peptide 1 (GLP-1) agonists

*Prescribe by brand.*

| | |
|---|---|
| **Liraglutide (Zegluxen)** pre-filled pen 6mg/ml | *daily dosing* |
| **Dulaglutide (Trulicity)** pre-filled pen 750micrograms, 1.5mg, 3mg, 4.5mg | *weekly dosing* |
| **Semaglutide (Ozempic)** pre-filled pen 250micrograms, 500micrograms, 1mg | *weekly dosing* |
| **Semaglutide (Rybelsus)** oral tablets, 3mg, 7mg,14mg | *daily dosing* |

1. A patient agreement form for initiating GLP-1's can be found in the Management of Type 2 Diabetes local guidance. This must be completed with the patient prior to initiating GLP-1 therapy for diabetes.
2. Exenatide (Bydureon) has been classified as **GREY** by exceptionality defined as intolerance to the preferred first line choice or restricted by its license.
3. Tirzepatide (Mounjaro) a GIP (glucose-dependent insulinotropic polypeptide) receptor and GLP-1 (glucagon-like peptide-1) receptor agonist has been classified as **GREY** for treating type 2 diabetes only as an alternative to GLP-1 agonist for patients with type 2 diabetes who require triple therapy if alternative GLP-1s are not tolerated by patient or not efficacious. Not all GLP-1s are equally tolerated, if a patient is unable to tolerate the first choice GLP-1, try alternative GLP-1 agonist (if available) before considering tirzepatide. See Type 2 diabetes guideline for details, doses above 5mg are **GREY** on specialist recommendation ONLY.
4. Review after 6 months of initiation to ensure continuation is in line with NICE NG28 (HBA1c reduction of 11 mmol/L and 3% weight loss).
5. MHRA June 2019: Diabetic ketoacidosis has been reported in patients with type 2 diabetes on a combination of a GLP-1 receptor agonist and insulin who had doses of concomitant insulin rapidly reduced or discontinued. GLP-1 receptor agonists are not substitutes for insulin, and any reduction of insulin should be done in a stepwise manner with careful glucose self-monitoring.
6. Suliqua (insulin glargine + lixisenatide) has been classified as **GREY** specialist initiation and stabilisation of dosage, restricted for those patients struggling to manage multiple injections. Ongoing specialist support should be maintained for patients on this treatment. Prescriber must ensure the correct strength and number of dose steps are stated on the prescription.
7. Liraglutide (Saxenda) / semaglutide (Wegovy) are **RED** as an adjunct to diet and exercise for weight loss management (NICE TA664/ TA875). Prescribing for this indication is restricted to specialist weight management service and is not licensed for use in type 2 diabetes. Semaglutide (Wegovy) is classified as **DNP** for managing overweight and obesity in young people aged 12 to 17 years.
8. It is not recommended to use GLP-1 and DPP4i's in combination because they target the same pathway. For further information see Accountable Health Partners.
9. The supply for GLP-1 RA has largely improved with all strengths and presentations of semaglutide and dulaglutide now available.

Thiazolidinedione (glitazones)

**Pioglitazone** tabs 15mg, 30mg, 45mg GREEN alongside other treatment options

1. Use of pioglitazone is associated with a small increased risk of bladder cancer. Healthcare professionals should be aware of new warnings and precautions for use in at-risk patients (MHRA Aug 2011)
2. Other known side effects and safety concerns include eye disorders, heart failure, oedema and increased risk of fractures.
3. Pioglitazone/Metformin combination products are classified as **DNP**.
4. For continued therapy, patient must show HbA1c reduction ≥5.5 mmol/mol in 6 months [local consensus based on previous NICE recommendation].

### 6.1.4 Treatment of hypoglycaemia

*For further information refer to the BNF.*

1. **Dextrogel** is currently the preferred brand of glucose 40%

### 6.1.5 Treatment of diabetic nephropathy and neuropathy

*Refer to the neuropathic pain guideline*

### 6.1.6 Diagnostic and monitoring agents for diabetes mellitus

*See Blood glucose and ketone meters, testing strips and lancets formulary*

JAPC preferred testing strip options

- Category 1- Type 1 diabetes or ketosis prone Type 2 diabetes: GlucoFix Tech/GlucoRx HCT
- Category 2- Type 2 diabetes: On Call Extra /GlucoRx Q
- Category 3- Type 2 diabetes requiring extra functionality: WaveSense Jazz

If either of the preferred options for categories 1 and 2 are not suitable, then any meter from the NHSE Commissioning Recommendations with blood glucose test strips costing less than £9 for 50, ketone testing strips less than £10 for 10 and corresponding lancets costing less than £4 per 100 are suitable for prescribing.

Safety lancets are designed so that the sharp retracts after use. These are primarily for the benefit of healthcare workers to avoid needle stick injury, **NOT** to be used by patients self-monitoring blood glucose. Neon Verifine is the recommended cost-effective safety lancet.

1. NICE NG28 recommends do NOT routinely offer self-blood glucose monitoring (SBGM) for adults with type 2 diabetes. For details see local diabetes guidance.
2. NICE NG17 recommends type 1 diabetics should test their blood glucose at least 4 times a day and up to 10 times a day if any of the following apply:
   - Desired target HbA1c level is not achieved,
   - Frequency of hypoglycaemic episodes increases,
   - There is a legal requirement to do so (e.g., such as before driving, in line with DVLA guidance)
   - During periods of illness
   - Before, during and after sport
   - When planning pregnancy, during pregnancy and while breastfeeding
   - If there is a need to know blood glucose levels >4 times a day for other reasons (e.g., impaired awareness of hypoglycaemia, high-risk activities).

   Newly diagnosed patients with (or are suspected to have) type 1 diabetes may need to test for both ketones and glucose.
3. Blood glucose testing for people with diabetes who drive - see chapter 3 of "assessing fitness to drive – guide for medical professionals for the latest information.
4. Freestyle Libre 2 plus /Dexcom ONE plus are **GREY** after diabetic consultant/specialist initiation within a Derbyshire Diabetes service - see JAPC briefing.
5. Freestyle Libre 3 is **RED**

### 6.2.1 Thyroid Hormones

*See also shared care pathology guideline*

**Levothyroxine (thyroxine)** tabs 25, 50, 100 micrograms (taken preferably 30 minutes before breakfast)

1. In the elderly, and in patients with significant ischaemic heart disease or long-standing profound hypothyroidism, thyroid hormones should be commenced at a low dose and increased very cautiously, since angina and arrhythmias can be precipitated on starting treatment. If the patient is very unstable, contact an endocrinologist for advice.
2. Local endocrinologists advise to use lower doses and taper up according to bio markers and QoL markers with an informed decision with the patient. They also recognise that NICE NG145 (2019) recommends consider starting dose for primary hypothyroidism in adults:
   - Age under 65 and *no* history of CVD: 1.6 micrograms/kg/day (rounded to nearest 25 micrograms)
   - Age 65 and over and adults with a history of CVD: 25-50 micrograms/day/with titration.
3. TSH level can take up to 6 months to normalise for people who had a very high TSH level before starting levothyroxine or a prolonged period of untreated hypothyroidism.
4. As levothyroxine (thyroxine) has a long half-life (about 7 days), full effects may not be seen for several weeks, and dosage adjustments should be made at 2-3 monthly intervals. Repeating thyroid function tests with a view to adjustment of replacement dosage any more frequently is inappropriate.
5. Follow up & monitoring for adults aged 16 and over:
   - Primary hypothyroidism: TSH every 3 months until level stabilised within reference range then once a year; Consider FT4 if symptoms persist after starting levothyroxine
   - Subclinical hypothyroidism (untreated or stopped levothyroxine treatment): consider measuring TSH and FT4 once a year if they have features suggesting underlying thyroid disease e.g., thyroid surgery or raised level of autoantibodies; otherwise, every 2-3 years.
6. A normal TSH may be found in patients with secondary hypothyroidism from pituitary disease – if clinically suspicious check FT4 level as well.
7. If pregnancy is being considered, aim for TSH around 0.3 – 2.5 mIU/L and recheck the TSH as soon as the pregnancy test is positive. Refer to the endocrine antenatal service if further advice needed or if patient becomes pregnant (urgent thyroid testing required).
8. The effects of warfarin may be potentiated when thyroid hormones are started.
9. Liothyronine in combination with levothyroxine is **AMBER** - for existing patients following review of benefit by an NHS endocrinologist and the treatment dose stabilised for 3 months. See shared care guideline. Liothyronine is classified as **Do Not Prescribe (DNP)** for new patients; **GREY** after specialist initiation by consultant psychiatrist for treatment resistant depression. See local position statement. Capsules are more cost effective than the tablets.
10. Desiccated thyroid products are classified as **Do Not Prescribe (DNP)** e.g., Armour/ERFA/Nature Thyroid. These are unlicensed products in the UK, derived from pig thyroid, and contain an excessive amount of L-T3 in relation to L-T4 For further information see the liothyronine position statement.
11. MHRA May 2021 Generic prescribing of levothyroxine remains appropriate for the majority of patients, and the licensing of these generic products is supported by bioequivalence testing. If a patient reports symptom(s) after changing their levothyroxine product, consider testing thyroid function. If a patient is persistently symptomatic after switching levothyroxine products, whether they are biochemically euthyroid or have evidence of abnormal thyroid function, consider consistently prescribing a specific levothyroxine product known to be well tolerated by the patient. If symptoms or poor control of thyroid function persist despite adhering to a specific product, consider prescribing levothyroxine in an oral solution formulation. Note levothyroxine oral solution is very expensive.

### 6.2.2 Antithyroid Drugs

*See also shared care pathology guideline*

**Carbimazole** 5mg, 20mg tabs (other strengths are non-formulary as are less cost -effective) **GREEN**

1. Hyperthyroid patients should be referred. Carbimazole may be initiated in primary care pending a patient referred to the specialist. Check FBC and LFT before starting but not again during treatment unless there is a clinical suspicion of agranulocytosis or liver dysfunction. See SPS drug monitoring.
2. MHRA Feb 2019 Carbimazole: increased risk of congenital malformation, particularly when used in the first trimester and at doses above 15mg/day. Women of childbearing potential should use effective contraception during treatment with carbimazole.
3. Specialist review of women on thyroid medication is recommended as early as possible in pregnancy.
4. MHRA Feb 2019 Carbimazole: risk of acute pancreatitis. If acute pancreatitis occurs during treatment with carbimazole, immediately and permanently stop treatment. Re-exposure to carbimazole may result in life-threatening acute pancreatitis with a decreased time to onset.
5. Counsel patient to report signs and symptoms suggestive of infection, especially sore throat, mouth ulcers, fever and rash, due to risk of neutropenia and agranulocytosis.

6. Hyperthyroid patients are generally more sensitive to oral anticoagulants; increased dosage of anticoagulant may be necessary as the hyperthyroidism becomes controlled. Frequent review of INR is therefore recommended.

### 6.3 Corticosteroids
### 6.3.1 Replacement Therapy

**Fludrocortisone** tabs 100 microgram GREEN

### 6.3.2 Glucocorticoid therapy

**Prednisolone** tabs 1mg, 5mg GREEN
**Dexamethasone** tabs 500microgram, 2mg GREEN
**Hydrocortisone** tabs 10mg, 20mg GREEN
(Other strengths of standard-release hydrocortisone tablets are non-formulary due to being less cost effective. As per the SPC the 10mg tablets can be divided into equal doses)

1. Corticosteroids should preferably be taken in the morning after breakfast. Prescribe gastroprotection in line with local guidance.
2. Plain prednisolone tablets can be crushed and dispersed in water for patients with swallowing difficulties. Prednisolone soluble tablets (5mg) are classified **GREY** restricted for use in patients with fine-bore tubes only. They are considerably more expensive than the plain tablets.
3. Hydrocortisone replacement therapy – doses are usually taken with the 3 main meals of the day to mimic the normal diurnal rhythm and to avoid insomnia because of late administration of hydrocortisone.
4. MHRA Dec 2018 Hydrocortisone muco-adhesive buccal tablets: should not be used off-label for adrenal insufficiency in children due to serious risks of insufficient cortisol absorption and life-threatening adrenal crisis.
5. Steroid warning cards should be carried by those on long term treatment, both replacement and therapeutic. Patients on replacement therapy should be fully educated about the need to increase dosage during intercurrent illness. Abrupt withdrawal of steroids following long term therapy (> 3 weeks) should be avoided.
6. National patient safety alert August 2020 - steroid emergency card to be issued by prescribers to help healthcare staff to identify appropriate patients and gives information on the emergency treatment if they are acutely ill, or experience trauma, surgery or other major stressors. Examples include patients who have received glucocorticoids at ≥5mg prednisolone or equivalent for more than 4 weeks; or 3 or more short courses of high-dose oral glucocorticoids within 12 months. Patient should also carry their steroid card for 12 months after stopping. For further guidance on this see Exogenous steroids, adrenal insufficiency and adrenal crisis-who is at risk and how should they be managed safely.
7. Prolonged courses of corticosteroids can increase susceptibility to infection and serious infections can go unrecognised. Unless already immune, patients are at risk of severe chickenpox and should avoid close contact with people who have chickenpox or shingles. Precautions should also be taken against contracting measles.
8. Patients on or commencing high dose oral corticosteroid long-term (7.5mg or more per day prednisolone or its equivalent for 3 months or more) should be offered bone protection with bisphosphonate. Patients taking lower doses of oral corticosteroids long term should be considered for fracture-risk assessment. See local Osteoporosis - diagnosis & management.
9. See BNF for information on initiating corticosteroids and equivalent doses.
10. MHRA Aug 2017 Advise patients to report any blurred vision or other visual disturbances due to rare risk of central serous chorioretinopathy with corticosteroids.

### 6.4 Sex Hormones
### 6.4.1 Female Sex Hormones
### 6.4.1.1 Oestrogens and HRT
*See local menopause guideline.*

### 6.4.1.2 Progestogens and progesterone receptor modulators

**Norethisterone** tabs 5mg GREEN
**Progesterone micronised** oral capsules 100mg GREEN

1. Ulipristal acetate **(Esmya)** 5mg tablets is classified as **Do Not Prescribe (DNP)** due to risk of serious liver injury- see MHRA February 2021. and MHRA March 2020.
2. Vaginal micronised progesterone 400mg twice daily (Cyclogest pessary/ Utrogestan vaginal capsules) are **GREEN** after consultant/ specialist initiation for the prevention of miscarriage as per NICE NG126 (off-label). GP may continue until 16 completed weeks of pregnancy.
   **RED** for the supplementation of luteal phase during assisted reproductive technology cycles.

### 6.4.2 Male Sex Hormones and Antagonists

**Testosterone preparations** for androgen deficiency are **GREEN** after consultant/specialist initiation. *See also SCP guideline.*
**Testosterone gel** for low sexual desire in post-menopausal women is **GREEN**. This is an off-label treatment, see local menopause management guideline
**Dutasteride** cap 500microgram **GREEN**
**Finasteride** tabs 5mg **GREEN**

1. Alpha blockers remain the drug of first choice for the medical management of benign prostatic hypertrophy (BPH). See section 7.4.1.
2. Choice of testosterone preparation should be based on cost-effectiveness and patient preference.
3. MHRA January 2023 Topical testosterone (Testogel): risk of harm to children following accidental exposure. Premature puberty and genital enlargement have been reported in children who were in close physical contact with an adult using topical testosterone and who were repeatedly accidentally exposed to this medicine. To reduce these risks, advise patients to wash their hands after application of topical testosterone, cover the application site with clothing once the product has dried, and wash the application site before physical contact with another adult or child.
4. Generic dutasteride/tamsulosin combination capsule is classified as **GREY**, for use when compliance is an issue with the separate components. Combodart is classified as **Do Not Prescribe (DNP)** as it is significantly more expensive.
5. Finasteride 1mg is not prescribable on the NHS and classified as **Do Not Prescribe (DNP)** for male baldness.
6. **MHRA April 2024 Finasteride: risk of psychiatric side effects and of sexual side effects.**
   - Finasteride has been associated with depression, suicidal thoughts and sexual dysfunction
   - patients have reported that sexual dysfunction (including decreased libido and erectile dysfunction) has persisted even after treatment was stopped.
   - before prescribing finasteride, ask patients if they have a history of depression or suicidal ideation
   - advise patients to stop finasteride 1mg for male pattern hair loss immediately if they develop depression or suicidal thoughts and to contact their doctor as soon as possible
   - advise patients prescribed finasteride 5mg for benign prostatic hyperplasia to consult their doctor for further medical advice as soon as possible if they develop depression or suicidal thoughts
   - monitor patients for psychiatric and sexual side effects

### 6.4.3 Anabolic Steroids
*No drug is recommended for this section.*

### 6.5 Hypothalamic and pituitary hormones and anti-oestrogens
### 6.5.1 Hypothalamic and anterior pituitary hormones and anti-oestrogens
For growth hormones (somatropin and somatrogon) follow shared care guideline
*All other drugs in this section are for specialist use only.*

### 6.5.2 Posterior pituitary hormones and antagonists

**Desmopressin** nasal spray 10 microgram/metered spray
**Desmopressin** tabs 100, 200 micrograms; 360microgram/ml oral solution
**Desmopressin** sublingual tabs 120, 240 micrograms

1. **GREEN** for nocturnal enuresis and **GREEN** after specialist recommendation for diabetes insipidus.
2. Desmopressin tablets are expensive and should be reserved for those patients who have problems with nasal preparations. The exception is primary nocturnal enuresis where only oral preparations are licensed. For prescribing advice see NICE CG 111 Bedwetting in under 19s.

3. Desmopressin oral solution 360 microgram/ml is available and cost effective. 180 microgram (0.5ml) oral solution is equivalent to 200 microgram tablet or 120 microgram sublingual tablet.
4. See BNF for warning regarding hyponatraemic convulsions:
   Patients being treated for primary nocturnal enuresis should be warned to avoid fluid overload (limit fluid intake from 1 hour before until 8 hours after administration and avoid ingesting during swimming) and to stop taking desmopressin during an episode of vomiting and diarrhoea (until fluid balance normal). The risk of hyponatraemic convulsions can also be minimised by keeping the recommended starting doses and by avoiding concomitant use of drugs which increase secretion of vasopressin (e.g., tricyclics)

## 6.6 Drugs affecting bone metabolism

### 6.6.1 Calcitonin and parathyroid hormone

*No drug is recommended for this section.*

### 6.6.2 Bisphosphonates and other drugs affecting bone metabolism

See local osteoporosis and bisphosphonate treatment length guideline for further detail. Calcium + Vitamin D preparations are listed in Nutrition & blood formulary chapter .

**Alendronic acid once-weekly** tabs 70mg
**Risedronate once-weekly** tabs 35mg

1. Patients should be made aware of the adverse reactions associated with oral bisphosphonates (MHRA Dec 2014, Dec 2015):
   - Serious oesophageal reactions- ensure administration direction adhered to
   - Osteonecrosis of the jaw- ensure good oral hygiene & regular dental check up
   - Atypical fractures- report any thigh, hip, or groin pain
   - Osteonecrosis of external auditory canal (rare)- report any ear pain, discharge from ear or ear infection
2. Alendronic acid and risedronate should be taken whole on arising, on the same day each week on an empty stomach (at least 30 minutes before the first food, beverage or medicinal product of the day) with a full glass (not less than 200ml) of plain water only (not mineral water). Patients should be advised to stay fully upright for at least 30 minutes after swallowing the tablet after administration. Alendronic acid is licensed for use in men at a dose of 10mg daily. However, in routine clinical practice the weekly 70mg preparation is standard and in line with national guidance. Risedronate once weekly 35mg is licensed in men.
3. Alendronic acid 70mg effervescent tablet (Binosto) is **GREY** for use in patients with dysphagia/long-term swallowing difficulties only. Patients with short-term swallowing difficulties should omit this treatment. Binosto should be fully dissolved in no less than 120ml of plain water and taken as per administration direction above. Patient should take 30ml of plain water after taking the dose.
4. Ibandronate 150mg monthly for osteoporosis is **GREY** due to lack of data on safety and effectiveness.
5. Ibandronate 50mg has been designated as **GREEN after consultant/specialist initiation-** use in post-menopausal women with breast cancer as per NICE NG101. Cost effective to prescribe generically.
6. If an oral bisphosphonate is not tolerated or is contraindicated, consider specialist referral. Specialist treatment options include denosumab, HRT, teriparatide, raloxifene, strontium ranelate & zoledronic acid.
7. Denosumab is **AMBER** for the prevention of osteoporotic fractures in post-menopausal women and men. Shared care guidance (SCG) can be found here. Denosumab (Prolia): should not be used in patients under 18 years due to the risk of serious hypercalcaemia (MHRA May 2022)
8. Other drug treatments for osteoporosis include raloxifene (**GREEN** specialist initiation as per NICE TA161); teriparatide, abaloparatide and zoledronate (zoledronic acid) which are classified **RED**.
9. Be aware that long-term treatment with some antiseizure medications (such as carbamazepine, phenytoin, primidone and sodium valproate) is associated with decreased bone mineral density and increased risk of osteomalacia. Follow the MHRA safety advice on antiepileptics: adverse effects on bone and consider vitamin D and calcium supplementation for people at risk.

## 6.7 Other endocrine drugs

### 6.7.1 Bromocriptine and other dopaminergic drugs

*Follow consultant advice. See local guideline for cabergoline and quinagolide.*

| | |
|---|---|
| Cabergoline | **GREEN after consultant initiation** |
| Quinagolide | **GREEN after consultant initiation** |
| Bromocriptine | **GREY after consultant/specialist initiation** |

1. Cabergoline and quinagolide are classified as **GREEN after consultant initiation** for hyperprolactinaemia only.
2. Bromocriptine is classified as **GREY after consultant/specialist initiation** for the treatment of hyperprolactinaemia, 2nd line to cabergoline. Indicated for patients wishing to become pregnant or for patients who are intolerant to cabergoline.
3. MHRA October 2024: blood pressure monitoring is essential especially during the first days of treatment.

### 6.7.2 Drugs affecting gonadotrophins

*Follow consultant/specialist advice*

| | |
|---|---|
| Goserelin | **GREEN after consultant/specialist initiation,** for licenced indications |
| Triptorelin | **GREEN after consultant/specialist initiation,** for licenced indications |
| Leuprorelin | **GREEN after consultant/specialist initiation,** for licenced indications |

1. **DNP** as per The Medicines Emergency Prohibition Order 2024 for new patients under 18 years of age for the purposes of puberty suppression in those experiencing gender dysphoria or incongruence.

### 6.7.3 Metyrapone

*Follow consultant/specialist advice*

### 6.7.4 Somatomedins

*Follow consultant/specialist advice*