

## Insulin

### Indication

- If triple therapy is not effective, not tolerated or contraindicated and the patient does not meet NICE criteria for a Glucagon-like peptide-1 (GLP-1) mimetic, or where rapid glycaemic control is indicated
- Insulin therapy should be considered for people:
  - With poor blood glucose control associated with marked symptoms, such as polyuria, polydipsia, and unintended weight loss
  - With poor blood glucose control despite maximum tolerated doses of other antidiabetic drug treatment
  - With suboptimal blood glucose control who are at high risk of complications, for example due to young age
  - Where oral antidiabetic drugs are contraindicated or not tolerated

### Mechanism of action

Type 2 diabetes (T2DM) is characterised by the body not responding effectively to insulin. Depending on their level of insulin resistance, people with T2DM may also need to take insulin injections to manage their blood sugar levels. Insulin helps control blood glucose levels by signalling the liver and muscle and fat cells to take in glucose from the blood.

### Prescribing information

- Insulins should only be prescribed by healthcare professionals who are trained and competent in prescribing insulins
- To avoid confusion and reduce the risk of prescribing or dispensing errors, **Insulins should be prescribed by brand name**, the [SWL Joint Formulary](#) contains preferred brands
- Insulin brands are linked with specific devices in which the patient will have been trained and there are now several biosimilar insulins available.
- First line choice in T2DM is Neutral Protamine Hagedorn (NPH) insulin (also called intermediate acting or isophane insulin) once or twice daily according to need. Formulary options for new initiations are Humulin I® and Human Insulatard®
- Consider starting both NPH and short-acting insulin either separately or as pre-mixed (biphasic) human insulin (particularly if glycated haemoglobin (HbA1c) is 75 mmol/mol (9.0%) or higher)
- Consider switching to Long-acting insulin analogue such as insulin detemir or insulin glargine from NPH insulin in adults with type 2 diabetes:
  - Who do not reach their target HbA1c because of significant hypoglycaemia
  - Who experience significant hypoglycaemia on NPH insulin irrespective of the level of HbA1c reached
  - Who cannot use the device needed to inject NPH insulin but could administer their own insulin safely and accurately if a switch to one of the long-acting insulin analogues was made

- Who need help from a carer or healthcare professional to administer insulin injections and for whom switching to one of the long-acting insulin analogues would reduce the number of daily injections
- Consider pre-mixed (biphasic) preparations that include short-acting insulin analogues, rather than pre-mixed (biphasic) preparations that include short-acting human insulin preparations, if:
  - The person prefers injecting insulin immediately before a meal
  - Hypoglycaemia is a problem
  - Blood glucose levels rise markedly after meals
- If initiating new patients on insulin glargine, biosimilar insulin is preferred local choice, prescribed by brand
- Monitor adults with T2DM who are on a basal insulin regimen (NPH insulin, insulin detemir or [insulin glargine](#)) for the need for short-acting insulin before meals (or a pre-mixed [biphasic] insulin preparation)
- Monitor adults with T2DMs who are on pre-mixed (biphasic) insulin for the need for a further injection of short-acting insulin before meals or for a change to a basal-bolus regimen with NPH insulin or insulin detemir or [insulin glargine](#), if blood glucose control remains inadequate

### GLP-1 and insulin

This combination is [Amber-2 on the SWL Joint Formulary](#). Initiation by a specialist, stabilisation (approximately three months), then continuation in primary care under an individual management plan.

### Dosing and titration

Dosing and titration based on individual response

### MHRA/Safety alerts

- [Insulin degludec \(Tresiba ▼\): available in additional higher strength](#) (December 2014)
- [High strength, fixed combination and biosimilar insulin products: minimising the risk of medication error](#) (April 2015)
- [Patient Safety Alert - Risk of severe harm and death due to withdrawing insulin from pen devices](#) (November 2016)
- [NHS Never Event: Overdose of insulin due to abbreviations or incorrect device](#) (January 2018)
- [Insulins \(all types\): risk of cutaneous amyloidosis at injection site](#) (September 2020)

### Noteworthy Interactions (Individual product license contains full list)

Clarithromycin might increase the risk of severe hypoglycaemia when given with Insulin. Manufacturer advises monitor blood glucose.

## Information on adverse effects (Individual product license contains full list)

- Obesity: insulin treatment may lead to further weight gain (2-3kg per year), with little or no improvement in blood glucose control
- Oedema
- Lipodystrophy
- Cutaneous amyloidosis
- Skin reactions

## Monitoring

Self-monitoring of blood glucose should be routinely offered and tailored to the persons individual needs depending on diabetes control and treatment plan . The suggested testing frequency below is only a **guide**; there may be situations where people may require testing more or less frequently depending on their individual needs and guidance from their specialist team. For example, more frequent testing would be required if hypoglycaemia is a concern or if the individual is experiencing hypoglycaemia:

- Once daily basal insulin: test **once daily**
- Twice daily basal insulin: test **twice daily**
- Twice daily mixed insulin: test **two to three times daily**
- Basal bolus regimen: test **at least four times a day**, including before each meal and before bed

Specialist teams may advise additional testing for individuals with certain co-morbidities including chronic kidney disease, frailty, foot ulceration and those who have had cardiac intervention . Frequency of testing will be advised by the specialist team.

## Sick Day rules

Never stop insulin: insulin doses may need to be increased during illness, especially if ketones are present, general [sick day rules](#) section contains further information.

## Counselling

For adults with T2DM starting insulin therapy, provide a structured programme using active insulin dose titration that encompasses:

- Injection technique, including rotating injection sites and avoiding repeated injections at the same point within sites
- Storage of devices
- Continuing telephone support
- Self-monitoring
- Dose titration to target levels
- Dietary advice
- The [DVLA's Assessing fitness to drive: a guide for medical professionals](#)
- Managing hypoglycaemia
- Managing acute changes in plasma glucose control

- Support from an appropriately trained and experienced healthcare professional

## Disposal

Insulin needles should be disposed of in a sharps bin, which can be prescribed. The full bins can usually be collected by the local council.

Links to local borough sharps disposal information

- [Croydon](#)
- [Kingston](#)
- [Merton](#)
- [Richmond](#)
- [Sutton](#)
- [Wandsworth](#)

Some Insulin pens can now be recycled to reduce plastic waste. Novo Nordisk has one such recycling scheme called PenCycle for their [insulin and GLP-1 pre-filled plastic pens](#). Signpost these patients to the [PenCycle website](#). Patients can collect a PenCycle return box from their [nearest participating pharmacy](#), or order [directly from Novo Nordisk](#).

## References

- [BNF online](#) (Last accessed 05/09/2022)
- [CKS – Insulin therapy in type 2 diabetes](#) (Last accessed 08/09/2022)
- [Pitstop for diabetes. Programme for insulin therapy for type 2 diabetes](#) (Last accessed 05/09/2022)
- [SEL Self-monitoring of blood glucose guidelines](#) (accessed 04/01/2023)

## Document History

**Version: V 1.0**

Author: **SWL Diabetes Clinical Network**

Approved by: Integrated medicines committee (IMOC)

Approval date: **15<sup>th</sup> February 2023**

Review date: 15<sup>th</sup> February 2025