

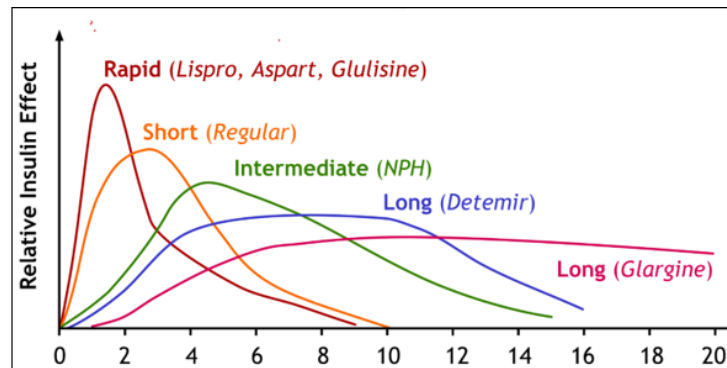
## Barnsley Guidance: Insulin Therapy in Type 2 Diabetes

### Introduction<sup>1,2</sup>

There are many different types of insulin. Insulins fall into three main categories: short-acting, intermediate-acting-, and long-acting.

Short-acting, insulins – These are available as:

- **Soluble insulin** (rarely used (eg Humulin S. Denoted regular on the graph)). When injected subcutaneously act within 30-60 minutes (Peak 1-4 hours) and duration of action of up to 9 hours.
- **Rapid-acting insulin** (eg Insulin aspart (Novorapid®), Insulin Glulisine (Apidra®, Insulin Lispro (Humalog®)). When administered subcutaneously have a rapid onset of action within 15 minutes (Peak around 1hour) and duration of action of 2-5 hours. Usually administered immediately before a meal.



Intermediate-acting insulins (eg Humulin® I, and Human Insulatard®) are given twice daily and are designed to mimic the effect of endogenous basal insulin (target basal hyperglycaemia). When given subcutaneously act in 1-2 hours (Peak 3 – 12 hours) and duration of action of 11-24 hours. Given as one or more daily injections alongside separate mealtime short acting insulin.

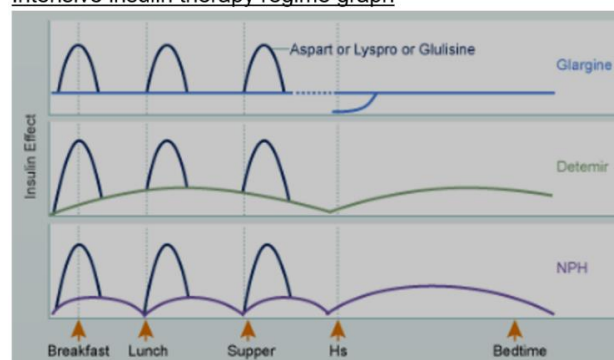
Long-acting insulin analogues and biosimilar (eg Insulin glargine (Abasaglar®, Lantus®), Insulin detemir (Levemir®), Insulin glargine (Toujeo®) and Insulin degludec (Tresiba®). Designed to mimic endogenous basal insulin. Administered 2hrs in advance of meal and does not reach a peak plasma level. Acts for up to 36 hours and can be used with rapid or short-acting insulin. Provides steady insulin for long periods.

Biphasic Premixed insulin (eg NovoMix® 30, Humalog® Mix 25 and 50, Humulin® M3). These contain combinations of short- and intermediate-acting insulin in ratios suggested by the number (eg NovoMix 30 = 30% short- and 70% intermediate acting insulin), Particularly effective in those with high HbA1c and lower BMI. Usually administered 10-30mins before breakfast and dinner and duration of between 10-16 hours dependant on insulin ratio.

### Insulin regimens<sup>3,4</sup>

If good diabetes control is not achieved with oral therapy alone, addition of an intermediate-acting or non-analogue insulin, usually in the evening may be considered. Patients usually continue to take metformin, but other anti-diabetic drugs should be reviewed and stopped if necessary. Recommended insulin regimes include:

Intensive insulin therapy regime graph



- human isophane insulin : injected once or twice daily, according to requirements **or**
- a human isophane insulin in combination with a short-acting insulin, administered either separately or as a pre-mixed (biphasic) human insulin preparation (this may be particularly appropriate if HbA1c is 75 mmol/mol (9.0%) or higher) **or**
- Insulin detemir or insulin glargine as an alternative to human isophane insulin. This can be preferable if a once daily injection would be beneficial (for example if assistance is required to inject insulin), or if recurrent symptomatic hypoglycaemic episodes are problematic, or if the patient would otherwise need twice-daily human isophane insulin injections in combination with oral glucose-lowering drugs. Also consider switching to insulin detemir or insulin glargine from human isophane insulin if significant hypoglycaemia is problematic, or in patients who cannot use the device needed to inject human isophane insulin **or**
- biphasic preparations (pre-mixed) that include a short-acting human analogue insulin (rather than short-acting human soluble insulin) can be preferable for patients who prefer injecting insulin immediately before a meal, or if hypoglycaemia is a problem, or if blood-glucose concentrations rise markedly after meals.

Insulin therapy should be initiated by a practitioner with the appropriate knowledge, competencies and experience to choose the most appropriate starting regime and injection device. Insulin therapy should be tailored to each patient, considering dexterity and any visual impairments, needle phobia's etc.

Barnsley council offer advice/services in regard to the disposal of clinical waste from patients homes. Further information and contact details can be found on the Barnsley Metropolitan Borough Council website at [Clinical waste \(barnsley.gov.uk\)](http://Clinical%20waste%20(barnsley.gov.uk)). Local discussion regarding the disposal of sharps bins are ongoing and additional information will be provided in due course.

When starting insulin therapy, bedtime basal insulin should be initiated and the dose titrated against morning (fasting) glucose. Patients who are prescribed a basal insulin regimen (human isophane insulin, insulin detemir or insulin glargine) should be monitored for the need for short-acting insulin before meals (or a biphasic insulin preparation).

Patients who are prescribed a [biphasic-premixed insulin](#) should be monitored for the need for a further injection of short-acting insulin before meals or for a change to a basal-bolus regimen with human isophane insulin or insulin detemir or insulin glargine if blood-glucose control remains inadequate.

### **Insulin combination therapy**<sup>5,6,7,8,9</sup>

1. GLP1 analogues in combination with insulin:
  - Liraglutide, exenatide, dulaglutide and semaglutide (oral and injectable) are all licensed for addition to patients currently receiving insulin. Lixisenatide whilst licensed as above can only be used in existing patients already prescribed lixisenatide. No new patients should be commenced on lixisenatide.
  - Patients being considered for this combination must fulfil the following criteria:
    - Significantly overweight (BMI >35 kg/m<sup>2</sup>) **and**
    - HbA1c > 75mmol/mol (9%) **and**
    - Currently using insulin
  - Please consult the updated [GLP1 agonist](#) shared care on the BEST website.
  - The combined therapy, Xultophy® (insulin degludec 100 units/ml + liraglutide 3.6 mg/ml) is currently non-formulary red on the Barnsley TL list.

- These regimens must be initiated by a specialist, with on-going support from a consultant-led multi-disciplinary team.
- Continue the GLP1 in combination with insulin only if the person has a reduction in HbA1c of  $\geq 11$  mmol/mol (1.0 %) <sup>1</sup> and a 3% loss of initial bodyweight in 6 months.

2. SGLT-2i plus insulin<sup>9,10,11</sup>

NICE recommends that an SGLT-2i in combination with insulin with or without other anti-diabetic drugs is an option for treating type 2 diabetes.

3. DPP4

Licensed for use in combination with insulin. NICE do not specifically mention using this combination together but state 'When dual therapy has not continued to control HbA1c to below the person's individually agreed threshold, also consider insulin-based therapy (with or without other drugs). Whilst this combination has been used locally it would be initiated only with specialist input from the hospital or diabetes nurses.

### **Insulin therapy induction advice**

Patients starting insulin therapy should have a structured initiation programme that encompasses:

- injection technique, including rotating injection sites and avoiding repeated injections at the same point within sites.
- 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.
- The following **WARNING should be given to all patients: NEVER** draw up insulin from an insulin cartridge or pre-filled pen using a syringe.
- All patients should be provided with an [insulin passport](#) (See Below).

Patients may be provided with the NHS diabetes '[The safe use of insulin and you](#)' Leaflet.

### **Insulin Passport**

All patients prescribed insulin should carry an insulin passport. An insulin passport is a patient held record containing information about the name and formulation of insulin prescribed. It is a credit card size and is expected that a patient will carry in wallet or phone.

Prescribers are reminded to issue an insulin passport to patients over 18 years currently prescribed insulin, including those patients being treated on a short-term basis e.g women with gestational diabetes. It is the responsibility of the healthcare professional prescribing the insulin to issue the patient with the insulin passport.. The insulin passport should be filled in

---

<sup>1</sup> A 0.5% difference in HbA1c is equivalent to a difference of about 5.5mmol/mol, and a 1% difference is equivalent to a difference of about 11mmol/mol. Note that these are rounded equivalents.

jointly between patient and healthcare professional. Many insulin manufacturers provide downloadable insulin products for their products via manufacturer website.

In Primary Care insulin passports should be ordered through the Primary Care Support England Portal <http://pcse.england.nhs.uk/supplies/> or filled in by printing out a template. This is available at: NPSA-2\_\_-\_\_patient\_insulin\_passport\_-\_2012-09.pdf (mysurgerywebsite.co.uk)

### Summary of Insulin on the Barnsley Joint Formulary

<https://www.barnsleyformulary.nhs.uk/searchresults.asp?SearchVar=insulin&Submit=Search>

Insulin	Strength	Traffic light status
<b>Short acting insulin:</b>		
<u>Soluble insulin</u>		
Insulin Human soluble (Humulin® S)	100units/ml	Green
Insulin human (Actrapid®)	100units/ml	Green
<u>Rapid acting insulin</u>		
Insulin lispro (Humalog®)	100units/ml	Green
	200units/ml	Green
Insulin aspart (Fiasp®)	100units/ml	<a href="#">Amber G Insulin Aspart (Fiasp®)</a>
Novorapid® (Insulin aspart)	100units/ml	Green
<b>Long-acting insulin analogues and biosimilar</b>		
Abasaglar® (Insulin glargine. Biosimilar)	100u/ml	Green
Lantus® (Insulin glargine)	100u/ml	Green
Levemir® (Insulin detemir)	100u/ml	Green
Toujeo® (Insulin glargine)	300u/ml	<a href="#">Amber G Toujeo®</a>
Tresiba® (Insulin degludec)	100u/ml	<a href="#">Amber G Tresiba®</a>
	200u/ml	<a href="#">Amber G Tresiba®</a>
<b>Biphasic Insulins</b>		
Novomix® 30 (Biphasic insulin aspart)	100u/ml	Green
Humalog® Mix25 (Biphasic insulin lispro)	100u/ml	Green
Humalog® Mix50 (Biphasic Insulin lispro)	100u/ml	Green
Humulin® M3 (Biphasic isophane insulin)	100u/ml	Green

## Contact names and details

Contact Details	Telephone number	Email
Dr E Uchegbu Consultant Diabetologist	01226 432598	<a href="mailto:elizabeth.uchegbu@nhs.net">elizabeth.uchegbu@nhs.net</a>
Dr Z Merza Consultant Endocrinologist and Diabetologist	01226 435366	<a href="mailto:z.merza@nhs.net">z.merza@nhs.net</a>
Prof TH Jones Consultant Endocrinologist and Diabetologist	01226 432147	<a href="mailto:Hugh.jones@nhs.net">Hugh.jones@nhs.net</a>
Dr P Rao Consultant Endocrinologist and Diabetologist	01226 431896	<a href="mailto:preethirao@nhs.net">preethirao@nhs.net</a>
Dr P Kosnarova Consultant Endocrinologist and Diabetologist	01226 435366	<a href="mailto:pavlakosnarova@nhs.net">pavlakosnarova@nhs.net</a>
Dr M W Rahman Consultant Endocrinologist and Diabetologist	01226 435941	<a href="mailto:m.rahman8@nhs.net">m.rahman8@nhs.net</a>
Dr V Shankaran Consultant Endocrinologist and Diabetologist	01226 465633	<a href="mailto:Vani.Shankaran1@nhs.net">Vani.Shankaran1@nhs.net</a>
Kerry Burns Lead Diabetes Specialist Nurse	01226 435646	<a href="mailto:Kerry.burns@nhs.net">Kerry.burns@nhs.net</a>
Helena Healey Diabetes Specialist Nurse	01226 435646	<a href="mailto:helenahealey@nhs.net">helenahealey@nhs.net</a>
Maxine Deacon Diabetes Specialist Nurse	01226 435646	<a href="mailto:maxine.deacon@nhs.net">maxine.deacon@nhs.net</a>
Gillian Turrell Medicines Information Pharmacist, BHNFT	01226 432857	<a href="mailto:gilliansmith2@nhs.net">gilliansmith2@nhs.net</a>
Sue Jones Diabetes Specialist Nurse, Barnsley CCG	01226 730000	<a href="mailto:sue.jones80@nhs.net">sue.jones80@nhs.net</a>

## References

- BNF treatment summaries insulin. Available at: <https://bnf.nice.org.uk/treatment-summaries/insulin/>. Accessed <March 2024>.
- Pharmacokinetic insulin effect and duration. Available at: <https://www.grepmed.com/images/1768/half-life-duration-pharmacology-endocrinology-diabetes-insulin>. Accessed <March 2024>.
- NICE treatment summaries type 2 diabetes. Available at: <https://bnf.nice.org.uk/treatment-summaries/type-2-diabetes/>. Accessed <March 2024>.
- Diabetes education nline. Available at: <https://dte.ucsf.edu/types-of-diabetes/type2/treatment-of-type-2-diabetes/medications-and-therapies/type-2-insulin-rx/intensive-insulin-therapy/>. <Accessed March 2024>.
- SPC Victoza (liraglutide) solution for injection in pre-filled pen. Available at: [Victoza 6 mg/ml solution for injection in pre-filled pen - Summary of Product Characteristics \(SmPC\) - \(emc\) \(medicines.org.uk\)](https://www.medicines.org.uk/emc/product/286/smpc). Accessed <March 2024>.
- SPC Byetta (exenatide) solution for injection in pre-filled pen. Available at <https://www.medicines.org.uk/emc/product/286/smpc>. Accessed <March 2024>.
- SPC Trulicity (dulaglutide) solution for injection in pre-filled pen. Available at: <https://www.medicines.org.uk/emc/product/3634/smpc>. Accessed <March 2024>.
- SPC Ozempic (semaglutide) solution for injection in pre-filled pen. Available at: <https://www.medicines.org.uk/emc/product/9748/smpc>. Accessed <March 2024>.
- SPC Rybelsus (semaglutide) tablets. Available at: [Rybelsus 3 mg - Summary of Product Characteristics \(SmPC\) - \(emc\) \(medicines.org.uk\)](https://www.medicines.org.uk/emc/product/9748/smpc). Accessed <March 2024>.
- NICE guidance (TA 315) canagliflozin in combination therapy for treating type 2 diabetes. Available at: <https://www.nice.org.uk/guidance/TA315/chapter/1-Guidance>. Accessed <March 2024>.
- NICE guidance (TA 315) dapagliflozin in combination therapy for treating type 2 diabetes. Available at: <https://www.nice.org.uk/guidance/TA288/chapter/1-Guidance>. Accessed <March 2024>.
- NICE Type 2 insulin recommendations in adults. Available at: <https://www.nice.org.uk/guidance/ng28/chapter/recommendations#insulin-based-treatments>. Accessed <July 2024>.
- Diabetes Specialist Nurse Forum UK: Insulin pens and devices chart. Available at: <https://static1.squarespace.com/static/636e507501d1fa72da31dd2d/t/6463d4f0ce6cd30b815a86cf/1684264177475/Insulin+types+%26+pen+devicesV1.pdf>. Accessed March 2024