Disclaimer

This guideline is registered at North Central London (NCL) Joint Formulary Committee (JFC) and is intended solely for use by healthcare professionals to aid the treatment of patients within NCL. However, clinical guidelines are for guidance only, their interpretation and application remain the responsibility of the individual clinician. If in doubt, contact a senior colleague or expert. Clinicians are advised to refer to the manufacturer’s current prescribing information before treating individual patients.

The authors and NCL JFC accept no liability for use of this information from this beyond its intended use. While we have tried to compile accurate information in this guideline, and to keep it updated in a timely manner, we cannot guarantee that it is fully complete and correct at all times. If you identify information within this guideline that is inaccurate, please report this to the admin@ncl-jfc.org.uk. If a patient is harmed as a consequence of following this guideline, please complete a local incident report and inform admin@ncl-jfc.org.uk.

This guideline is not to be used or reproduced for commercial or marketing purposes.

NCL JFC is funded by and provides advice to Acute Trusts and Clinical Commissioning Groups in NCL.
Document control

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2016</td>
<td>1.0</td>
<td>NA</td>
</tr>
</tbody>
</table>

Document management

<table>
<thead>
<tr>
<th>Groups / Individuals who have overseen the development of this guidance:</th>
<th>Camden IPU, RFL Diabetologists, Haringey and Camden Medicines Management Team, JFC Support Pharmacists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups which were consulted and have given approval:</td>
<td>All NCL Diabetologists, Diabetes Consultant and Specialist Nurses, GPs, Commissioners</td>
</tr>
<tr>
<td>File name:</td>
<td>Insulin for Adults with Type 2 Diabetes_25Jul16.docx</td>
</tr>
<tr>
<td>Version number:</td>
<td>V1.0</td>
</tr>
<tr>
<td>Disseminated to:</td>
<td>NCL Diabetologists, Diabetes Consultant and Specialist Nurses, GPs, practice nurses</td>
</tr>
<tr>
<td>Equality impact assessment:</td>
<td>Low</td>
</tr>
<tr>
<td>NCL Joint Formulary Committee Approval date:</td>
<td>June 2016</td>
</tr>
<tr>
<td>Review date:</td>
<td>June 2019, or earlier if new evidence emerges</td>
</tr>
</tbody>
</table>
1. **Target audience**

Secondary and Primary care

2. **Purpose**

The guideline provides recommendations on the following areas of type 2 diabetes (T2DM) management:

- Clinical monitoring of blood glucose control: HbA1c, self-monitoring blood glucose
- Insulin regimens
- Choice of insulins

This guideline does not cover:

- Oral hypoglycaemic agents (OHAs) and GLP-1 receptor agonists (GLP-1 RA) in insulin naïve patients with T2DM
- OHAs and GLP-1RAs as adjuvant to insulin in patients with T2DM
- Children and young people with T2DM
- People with type 1 or other types of diabetes
- Preconception care in women with type 2 diabetes and diabetes in pregnancy
- Management of microvascular and microvascular diabetic complications
- Broader management of patients with T2DM e.g. diagnosis, educational programs

3. **Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>GLP-1 RA</td>
<td>Glucagon-like peptide-1 (GLP-1) receptor agonists</td>
</tr>
<tr>
<td>LAIA</td>
<td>Long-acting insulin analogue</td>
</tr>
<tr>
<td>NICE</td>
<td>National Institute for Health and Care Excellence</td>
</tr>
<tr>
<td>NPH</td>
<td>Neutral Protamine Hagedorn (human insulin)</td>
</tr>
<tr>
<td>OHA</td>
<td>Oral hypoglycaemic agents</td>
</tr>
<tr>
<td>T2DM</td>
<td>Type 2 diabetes mellitus</td>
</tr>
</tbody>
</table>

4. **Introduction to insulin treatment in type 2 diabetes**

In people with type 2 diabetes (T2DM) there is a steady decline in beta cell function that leads to progressive hyperglycaemia, despite continued therapy with OHAs or GLP-1 RAs. Consequently, many people with T2DM will ultimately need insulin therapy. The role of insulin is to lower blood glucose to prevent hyperglycaemia and its associated complications, such as cardiovascular disease, retinopathy and neuropathy (1). The targets for glycaemic control should be individualized to meet each person's particular needs, priorities, and risk of disabling hyperglycaemia.

5. **Insulin for people with Type 2 Diabetes**

Consider triple OHA therapy or insulin-based treatment for adults with T2DM if:

- Dual therapy with metformin and another OHA has not continued to control HbA1c to below the person’s individually agreed threshold for intensification

Insulin-based treatment is recommended for adults with T2DM if:

- Triple therapy with metformin has not continued to control HbA1c to below the person’s individually agreed threshold for intensification
- Dual therapy, where metformin is contraindicated or not tolerated, has not continued to control HbA1c to below the person’s individually agreed threshold for intensification
- Oral hypoglycaemic treatment or non-insulin therapies are not tolerated or are contra-indicated
• The individual is symptomatic e.g. rapid weight loss, polyuria, nocturia, recurrent fungal infections (especially genital thrush) or bacterial infections (especially urine infections)
• The individual expresses a preference for insulin treatment to achieve early / sustained optimal glycaemic control

6. **Personalised HbA1c targets**

Involve adults with type 2 diabetes in decisions about their individual HbA1c target.

Encourage them to achieve the target and maintain it unless any resulting adverse effects (including hypoglycaemia), or their efforts to achieve their target, impair their quality of life.

Offer dietary advice (see NICE NG28, section 1.3) and drug treatment to support adults with type 2 diabetes to achieve and maintain their HbA1c target.

In adults with type 2 diabetes, measure HbA1c levels at:
- 3–6-monthly intervals (tailored to individual needs), until the HbA1c is stable on unchanging therapy
- 6-monthly intervals once the HbA1c level and blood glucose lowering therapy are stable

<table>
<thead>
<tr>
<th>Patients group</th>
<th>Target HbA1c presumption (this must be individualised)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients managed by lifestyle and diet</td>
<td>&lt; 48 mmol/mol (6.5%)</td>
</tr>
<tr>
<td>If all the following apply:</td>
<td>48 mmol/mol (6.5%)</td>
</tr>
<tr>
<td>• Younger patients &lt; 60 years within 10 years of diagnosis</td>
<td></td>
</tr>
<tr>
<td>• Without established macrovascular disease (IHD, CVA, PVD)</td>
<td></td>
</tr>
<tr>
<td>• Taking a <strong>single oral agent</strong> which is not associated with risk of hypoglycaemia (metformin, gliptin, SGLT2-i, pioglitazone)</td>
<td></td>
</tr>
</tbody>
</table>

| If all the following apply:           | 53 mmol/mol (7.0%)                                      |
| • Younger patients < 60 years within 10 years of diagnosis |                                        |
| • Without established macrovascular disease (IHD, CVA, PVD)   |                                        |
| • Without CKD on dialysis              |                                        |
| • Low risk for serious consequences of hypoglycaemia          |                                        |
| • Taking SU/repaglinide/insulin/GLP-1RA **OR** on more than one oral agent | |
| • Without significant comorbidities                              |                                        |

| If life-expectancy > 10 years and any of the following apply: | 58 mmol/mol (7.5%)                                      |
| • Age > 60 years or duration diabetes > 10 years              |                                        |
| • Established macrovascular disease (IHD, CVA, PVD)            |                                        |
| • CKD on dialysis                                             |                                        |
| • Tight control poses a high risk of the consequences of hypoglycaemia (e.g. risk of falling, impaired awareness of hypoglycaemia, people who drive or operate machinery as part of their job) | |
| • Experiences recurrent hypoglycaemia on SU/insulin           |                                        |
| • Significant comorbidities                                   |                                        |

| Patients who are frail and elderly (>80 years), dementia and/or life-expectancy < 10 years | 69 mmol/mol (8.5%)                                      |
7. **Choice of insulin regimens**

There are three main insulin regimens:

1) **Basal insulin** (usually once-daily)
   - Used for insulin naïve patients with HbA1c <9% (75mmol/mol)
   - Treatment involves once daily basal insulin, increasing to twice daily in some patients.

2) **Biphasic or pre-mixed insulin** (usually twice-daily)
   - Used for insulin naïve patients with a very high HbA1c (>9% [75mmol/mol]) and in patients who are failing to achieve adequate HbA1c levels with basal insulin.
   - Biphasic insulin is a pre-mixed suspension of short/fast-acting and intermediate-acting insulin.
   - Treatment may involve one to three daily injections of biphasic insulin before meals.

3) **Basal-bolus insulin** (multiple daily injection regimen)
   - Basal-bolus insulin is not commonly used in T2DM however may be useful in patients who have flexible lifestyles, are very sensitive to insulin, or in patients who develop significant postprandial hyperglycaemia.
   - Treatment involves once-daily basal insulin with separate rapid-acting bolus insulin before at least one main meal.

Continuous subcutaneous insulin infusion (insulin pump therapy) is not recommended for patients with T2DM (2).

See Appendix 1 for the insulin regimen flow diagram. See Appendix 2 for a summary of the properties of available insulins.
7.1. Basal insulin

**Recommendation**

- Once-daily NPH insulin in the evening is the 1st choice insulin regimen for insulin naïve adults with HbA1c <9% (<75mmol/mol)
  - Insuman Basal SoloStar will be suitable for most patients
  - Consider Insulatard Innolet for patients with dexterity or visual impairment
- Consider biosimilar insulin glargine (Abasaglar) if a patient
  - Experiences problematic hypoglycaemia with NPH insulin
  - Would require twice-daily NPH insulin
  - Has significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia
- Patients prescribed insulin glargine (Lantus) should consider transition to biosimilar insulin glargine (Abasaglar) following counselling at a routine diabetes appointment
- Once- and twice-daily insulin detemir (Levemir) is not recommended

**Further information**

Once-daily NPH insulin is the first-line basal insulin and should usually be initiated in the evening. NICE does not recommend a specific NPH insulin and there is little evidence for preference of one NPH insulin over another therefore choice should be based on device preference, clinical experience and acquisition cost. Insuman Basal is available as a SoloStar pre-filled pen device and is the lowest cost NPH insulin therefore should be considered first for most patients, if the clinician feels appropriate. Insulatard is available as an Innolet pre-filled device and is preferred for patients with visual impairment or dexterity issues.

Once-daily biosimilar insulin glargine 100IU/mL (Abasaglar) should only be considered for patients already prescribed once-daily NPH insulin who experience:

- Problematic hypoglycaemic, defined as frequent unpleasant minor hypoglycaemia (patient can self-treat) where dose titration following assessment as not worked, or 1 episode of severe hypoglycaemia (requiring third party assistance), or 1 episode associated with impaired awareness of hypoglycaemia, extreme glycaemic liability, or major fear and maladaptive behavior (1,3)
- Would require dose escalation to twice-daily NPH insulin (1,3)

If a patient is being transitioned from insulin glargine 100IU/mL (Lantus) to biosimilar insulin glargine 100IU/mL (Abasaglar) this should be discussed during a patient consultation with a demonstration of the new device. Direct 'script-switches' without patient agreement are likely to cause confusion and are not recommended.

Patients with significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia should be considered for a relaxed HbA1c target (>7.5%, [58 mmol/mol]) and 1st line basal analogue insulin.

Once-daily insulin detemir is not recommended as the shorter duration of action compared to insulin glargine (16hrs vs 24hrs) is unlikely to provide adequate insulin cover. Furthermore a recent systematic literature review identified a 26-wk study which found once-daily insulin detemir to be inferior to once-daily insulin glargine at reducing HbA1c and required a larger total daily dose (4).

Twice-daily insulin detemir is not recommended as insulin detemir is more costly than insulin glargine, and there is no evidence of superiority in terms of HbA1c control or hypoglycaemia (5,6). Twice-daily detemir has a short term non-clinically significant weight benefit (0.8kg) over once-daily glargine (5,6) however the incremental cost does not justify the small benefit. Data to suggest that insulin detemir is weight sparing in obese patients is inconclusive and is limited to a single-arm observational study of once-daily detemir used 1st line for OHA failure (7) and one study of twice-daily detemir which excluded patients with BMI ≥ 35kg/m² (8,9).
7.2. Biphasic or pre-mixed insulin

Recommendation

- Twice-daily biphasic human insulin is the 1st choice insulin regimen for insulin naïve adults with an HbA1c >9% (>75mmol/mol)
- Consider a twice-daily biphasic human insulin if the patient:
  - Experiences significant postprandial hyperglycaemia with NPH insulin
- Consider a twice-daily biphasic analogue insulin, rather biphasic human insulin if the patient:
  - Prefers to inject insulin with meals (rather than 30-45 minutes before meals)
  - Experiences problematic hypoglycaemia with biphasic human insulin
  - Experiences significant postprandial hyperglycaemia with biphasic human insulin
  - Has significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia
  - Fails to achieve adequate control on once-daily biosimilar glargine (Abasaglar)
- A once-daily and three-times daily regimes may useful however this is dependent on the individual patient’s preference, convenience and insulin resistance

Insuman Comb 25 (25% soluble, 75% isophane) will be suitable for most patients requiring biphasic human insulin.

Humalog Mix 25 KwikPen (25% lispro, 75% lispro protamine) will be suitable for most patients requiring biphasic analogue insulin.

Further information

Twice-daily biphasic human insulin is the 1st line insulin for patients with an HbA1c ≥9% (75mmol/mol). Biphasic human insulin should be taken 30-45 minutes before a meal (10,11). NICE does not recommend one specific biphasic human insulin over another therefore choice should be based on device preference, clinical experience and acquisition cost. The Insuman Comb range is available in a Solostar device and includes Insuman Comb 25 (25% soluble, 75% isophane) and Insuman Comb 50 (50% soluble, 50% isophane). Patients frequently need to increase the ratio of prandial insulin above 25-30% and the Insuman Comb range is the only range that includes a 50% soluble biphasic human insulin, therefore Insuman Comb should be considered first for most patients.

Twice-daily biphasic analogue insulins have a faster onset of action and can be injected with meals therefore should be reserved for patients who prefer to inject with meals or who have significant postprandial hyperglycaemia with biphasic human insulin. Biphasic analogue insulin should also be considered who patients who experience significant hypoglycaemia with biphasic human. NICE does not recommend one specific biphasic analogue insulin over another therefore choice should be based on device preference, clinical experience and acquisition cost. The Humalog Mix range is available in a KwikPen device and includes Humalog Mix25 (25% soluble, 75% lispro protamine) and Humalog Mix50 (50% lispro, 50% lispro protamine). The Humalog Mix range is the only range that includes 50% rapid acting biphasic insulin therefore should be considered first for most patients.

Patients with significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia should be considered for a relaxed HbA1c target (>7.5% [58 mmol/mol]) and 1st line biphasic analogue insulin.

7.3. Basal-bolus insulin

Recommendation

Consider basal-bolus insulin analogue regimens if:

- The patient has a lower body weight and is very sensitive to insulin
- Twice-daily biphasic insulin is failing to adequately control HbA1c and the patient is experiencing
significant postprandial hyperglycaemia after snacks and lunch

- Basal insulin is failing to adequately control HbA1c and the patient is suitable for a basal-bolus regimen
- Individuals who lead unpredictable lifestyles or would prefer to carbohydrate count and adjust prandial insulin doses to accommodate varying meal sizes / dieting / exercise

**Further information**

Peak activity for rapid-acting insulin analogues is between 1 – 2 hours compared to 2 – 4 hours for soluble human insulins. Rapid-acting insulin analogues therefore avoid post-prandial hyperglycaemia, related to the delayed onset and peak of action of human soluble insulins. There is no evidence that any rapid-acting insulin analogue has superiority over another. The two most commonly used rapid-acting insulin analogues are insulin lispro (Humalog®) and insulin aspart (NovoRapid®).

Due to the rapid-acting profile of analogues, these insulins allow flexibility with lifestyle and the timing of meals which can become more important with periods of fasting and sleep (during religious fasts or with shift-work).

### 7.4. Insulin management for patients receiving long-term district nursing

Adult patients with T2DM who require long-term district nurse care may require a different treatment pathway to allow flexibility in insulin timing. When considering a meal-time insulin, discuss the feasibility of co-ordinating meal times and insulin administration with the patient and district nursing team.

- Regimens should only be changed where this is clinically appropriate and in the best interests of the patient
- Establish whether the patient would prefer morning or evening administration of basal insulin (there is usually more staff during the day service than at night service)
- Consider once-daily biosimilar glargine in place of twice-daily NPH insulin for patients who would otherwise be suitable for once-daily district nurse visits
- Consider twice-daily NPH insulin (which will provide some peak) in place of twice-daily biphasic insulin where administration cannot be guaranteed around meal times which might otherwise increase the risks of hyperglycaemia, hypoglycaemia and snacking related weight gain
- Should the requirement for long-term district nursing care be no longer required, consider reverting to the original insulin regimen if not well controlled on current regimen

### 7.5. Longer acting basal insulin analogues

**Recommendation**

- Toujeo (insulin glargine 300IU/mL) is **not recommended**
- Tresiba (insulin degludec) is **not recommended**

**Further information**

Toujeo (insulin glargine 300IU/mL) and Tresiba (insulin degludec) are both more expensive than Abasaglar (biosimilar insulin glargine) and only offer a small reduction in the risk of nocturnal hypoglycaemia. This marginal benefit is not considered sufficient to justify the additional cost.

Toujeo (insulin glargine 300IU/mL) is limited to injecting 80IU insulin therefore offers no benefit to patients who need to inject large volumes of glargine as multiple injections are still required.

### 8. Self-monitoring blood glucose target

Agree individual targets with the patient and where possible aim for:
• Pre-breakfast or fasting glucose level of 4-6mmol/l and pre-prandial levels at other times of the day at 4-7mmol/l
• Post-prandial (i.e. 2 hours after a main meal) <9mmol/l but this will depend on the individual (e.g. in the elderly or end of life care these targets may not be appropriate)

See Section 6 on setting patient specific HbA1c thresholds for intensification.

9. **Associated documents**

Guideline for Antihyperglycaemic agents for Type 2 diabetes V1.0 [link](#)
GP Fact Sheet for liraglutide and dulaglutide for Type 2 diabetes V1.0 [link](#)
10. References


11. eMC. SPC for Insuman Comb 25 100 IU/ml suspension for injection in a cartridge. Available at http://www.medicines.org.uk/emc/medicine/26473. Sanofi;


Appendix 1: Summary of treatment recommendations

Patient with T2DM requiring insulin

Is the patient currently prescribed insulin?

Yes

Is the patient meeting their HbA1c target with an acceptable frequency and severity of hypoglycaemia?

No

Current on NPH insulin?

Yes

Patient experiencing significant post-prandial hyperglycaemia?

No

Currently on basal analogue?

Yes

Patient experiencing daytime hyperglycaemia?

No

Twice daily analogue insulin (e.g. Humalog Mix25) with meals

Up-titrate existing insulin regimen if frequency and severity of hypoglycaemia is acceptable. Regular review to include glucose control, HbA1c and frequency and severity of hypoglycaemia

No

Currently on biphasic human insulin?

Yes

Patient experiencing recurrent symptomatic hypos, or daytime hyperglycaemia?

No

Currently on biphasic analogue insulin?

Yes

Significant daytime hyperglycaemia?

No

Three times daily biphasic analogue insulin with meals (consider biphasics with a higher proportion of fast-acting insulin) OR basal-bolus insulin

OD to TDS NovoRapid with meals and biosimilar glargine (Abasaglar) at night or at the same time each day

No

Once daily NPH in the evening (Insulan Basal SoloStar) consider Insulatard Innolet for patients with dexterity or visual impairment

No

Once daily biosimilar glargine (Abasaglar) at night or at the same time each day

No

Twice daily biphasic human insulin (Insulan Comb 25), 30 minutes before meals, consider OD dosing if patient is reluctant to initiate with BD

No

Twice daily biphasic analogue insulin (Humalog Mix25) with meals consider OD dosing if patient is reluctant to initiate with BD

Once daily biosimilar glargine (Abasaglar) at night or at the same time each day

Yes

Does the patient have significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia?

No

Can biphasic insulin be given 30-45 minutes before a meal?

Yes

Does the patient have significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia?

No

Significant daytime hyperglycaemia?

No

Up-titrate NPH insulin

Yes

Regular review to include glucose control, HbA1c and frequency and severity of hypoglycaemia

Yes

Patient with T2DM requiring insulin

Is the patient currently prescribed insulin?

Yes

Is the patient’s HbA1c >75mmol/mol (9.0%), or significant difference between pre-prandial and postprandial BMs

Yes

Does the patient have significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia?

No

Can biphasic insulin be given 30-45 minutes before a meal?

Yes

Does the patient have significant co-morbidities, or who are at risk of falling, or have impaired awareness of hypoglycaemia?

No

Significant daytime hyperglycaemia?

No

Up-titrate NPH insulin

Yes

Regular review to include glucose control, HbA1c and frequency and severity of hypoglycaemia

North Central London Joint Formulary Committee 12 of 15

Insulin for Adults with Type 2 Diabetes

Approval date: June 2016

Version 1.0

Expiry date: June 2019
Appendix 2: Formulations of available insulin

(12–15)

### Bolus insulin

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Approved name</th>
<th>10mL vial</th>
<th>Prefilled device</th>
<th>3mL cartridge</th>
<th>Compatible pen/device with the cartridge</th>
<th>Approximate time action profile</th>
<th>Typical dosing schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>NovoRapid</td>
<td>Insulin aspart 100IU/mL</td>
<td>✓</td>
<td>3mL FlexPen &amp; FlexTouch pen</td>
<td>✓</td>
<td>NovoPens</td>
<td>Usually three times a day subcutaneously within 15 minutes before, or just after food</td>
<td></td>
</tr>
<tr>
<td>(Novo Nordisk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100IU/mL strength may be used in continuous subcutaneous insulin pumps</td>
</tr>
<tr>
<td>Humalog</td>
<td>Insulin lispro 100IU/mL</td>
<td>✓</td>
<td>3mL KwikPen</td>
<td>✓</td>
<td>HumaPens, Autopen Classic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Eli Lily)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insulin lispro 200IU/mL</td>
<td>✓</td>
<td>3mL KwikPen</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apidra</td>
<td>Insulin glulisine 100IU/mL</td>
<td>✓</td>
<td>3mL SoloStar</td>
<td>✓</td>
<td>Aventis Pens, Autopen 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sanofi Aventis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Basal insulin – human isophane insulin (NPH)

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Approved name</th>
<th>10mL vial</th>
<th>Prefilled device</th>
<th>3mL cartridge</th>
<th>Compatible pen/device with the cartridge</th>
<th>Approximate time action profile</th>
<th>Typical dosing schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insuman Basal</td>
<td>Isophane insulin</td>
<td>✔</td>
<td>3mL SoloStar</td>
<td>✔</td>
<td>ClikSTAR, Autopen 24</td>
<td></td>
<td>Usually once-daily, can be twice-daily subcutaneously</td>
</tr>
<tr>
<td>(Sanofi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulatard</td>
<td>Isophane insulin</td>
<td>✔</td>
<td>3mL Innolet</td>
<td>✔</td>
<td>NovoPen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Novo Nordisk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humulin I</td>
<td>Isophane insulin</td>
<td>✔</td>
<td>3mL KwikPen</td>
<td>✔</td>
<td>HumaPens, Autopen Classic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Eli Lily)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Basal insulin – analogue insulin

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Approved name</th>
<th>10mL vial</th>
<th>Prefilled device</th>
<th>3mL cartridge</th>
<th>Compatible pen/device with the cartridge</th>
<th>Approximate time action profile</th>
<th>Typical dosing schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abasaglar</td>
<td>Biosimilar insulin glargine 100IU/mL</td>
<td>✔</td>
<td>3mL KwikPen</td>
<td>✔</td>
<td>HumaPens, Autopen Classic</td>
<td></td>
<td>Usually once-daily subcutaneously</td>
</tr>
<tr>
<td>(Eli Lily)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lantus</td>
<td>Insulin glargine 100IU/mL</td>
<td>✔</td>
<td>3mL SoloStar</td>
<td>✔</td>
<td>Aventis Pens, Autopen 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sanofi Aventis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toujeo</td>
<td>Insulin glargine 300IU/mL</td>
<td>✔</td>
<td>1.5mL SoloStar</td>
<td></td>
<td>Similar to above, duration up to 30hrs</td>
<td></td>
<td>Usually once-daily subcutaneously</td>
</tr>
<tr>
<td>(Sanofi Aventis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Human biphasic (pre-mixed) insulin

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Approved name</th>
<th>10mL vial</th>
<th>Prefilled device</th>
<th>3mL cartridge</th>
<th>Compatible pen/device with the cartridge</th>
<th>Approximate time action profile</th>
<th>Typical dosing schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insuman Comb 15</strong></td>
<td>Soluble &amp; isophane insulin</td>
<td>5mL vial</td>
<td>3mL SoloStar</td>
<td></td>
<td></td>
<td></td>
<td>Autopen 24</td>
</tr>
<tr>
<td>(Sanofi Aventis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Insuman Comb 25**       | Soluble & isophane insulin | 3mL KwikPen |               |               | HumaPens, Autopen Classic                | Action profiles vary according to ratio of soluble and isophane insulin | Usually twice-daily subcutaneously; can be used three times daily.
| (Sanofi Aventis)          |               |           |                  |               |                                         |                                 | Note that these are cloudy insulins that need re-suspending before use |
| **Insuman Comb 50**       | Soluble & isophane insulin |           |                  |               |                                         |                                 | Autopen 24              |
| (Sanofi Aventis)          |               |           |                  |               |                                         |                                 |                        |
| **Humulin M3**            | Soluble & isophane insulin |           |                  |               |                                         |                                 | Autopen 24              |
| (Eli Lilly)               |               |           |                  |               |                                         |                                 |                        |

Data for Insuman Comb was not included in the Leeds Poster and was therefore taken from the BNF (15)

### Analogue biphasic (pre-mixed) insulin

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Approved name</th>
<th>10mL vial</th>
<th>Prefilled device</th>
<th>3mL cartridge</th>
<th>Compatible pen/device with the cartridge</th>
<th>Approximate time action profile</th>
<th>Typical dosing schedule</th>
</tr>
</thead>
</table>
| **Humalog Mix 25**        | Biphasic insulin lispro |           |                  |               | HumaPens, Autopen Classic                | Action profiles vary according to ratio of rapid and intermediate acting insulin | Usually twice-daily subcutaneously; can be used three times daily.
| (Eli Lilly)               |               |           |                  |               |                                         |                                 | Note that these are cloudy insulins that need re-suspending before use |
| **Humalog Mix 50**        |               |           |                  |               |                                         |                                 |                        |
| (Eli Lilly)               |               |           |                  |               |                                         |                                 |                        |
| **NovoMix 30**            | Biphasic insulin aspart |           |                  |               | NovoPen                                  | Action profiles vary according to ratio of rapid and intermediate acting insulin | Usually twice-daily subcutaneously; can be used three times daily.
| (Eli Lilly)               |               |           |                  |               |                                         |                                 | Note that these are cloudy insulins that need re-suspending before use |

North Central London Joint Formulary Committee

Insulin for Adults with Type 2 Diabetes

Approval date: June 2016

Version 1.0

Expiry date: June 2019