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Best practice guide for primary care healthcare professionals:

# **BASAL INSULIN INITIATION IN ADULTS WITH TYPE 2 DIABETES**



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## ABOUT THIS GUIDANCE

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### About TREND-UK

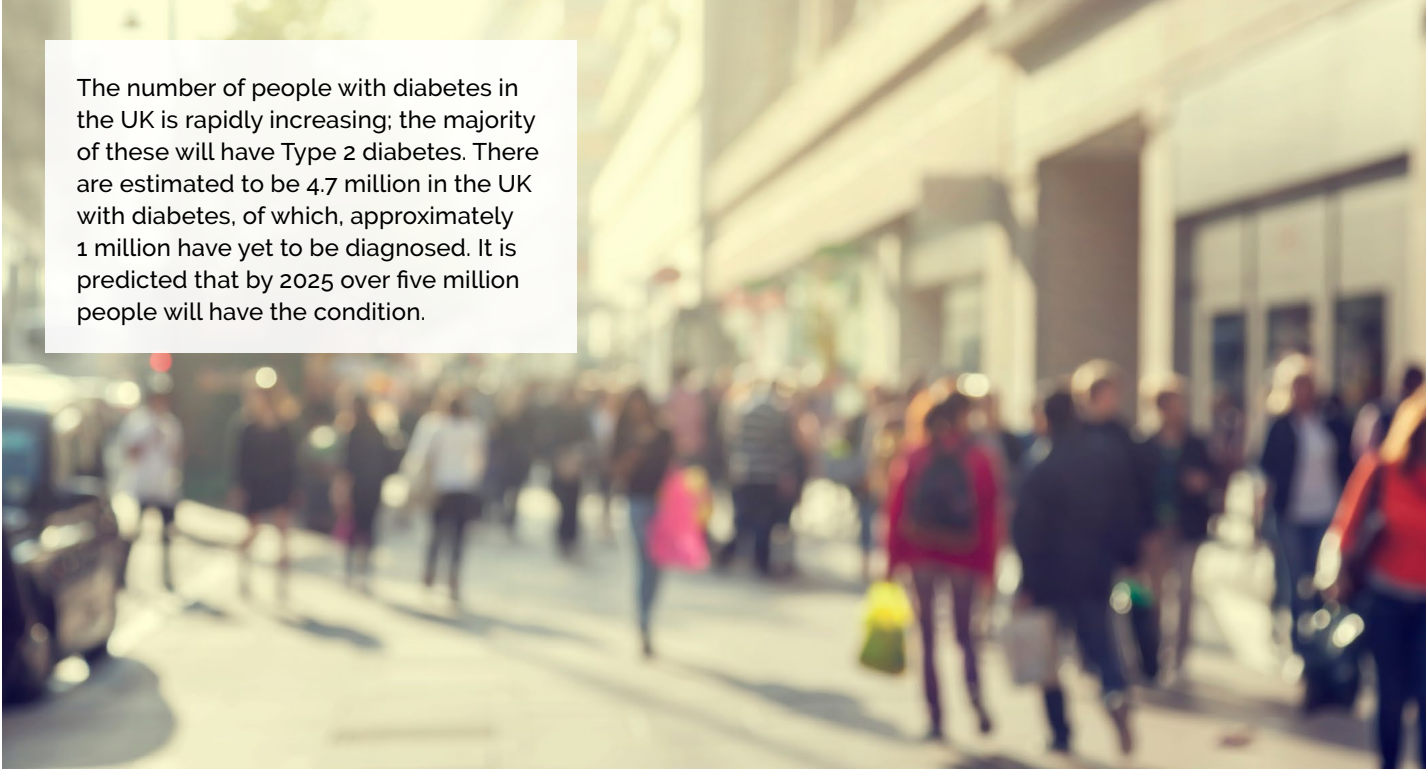
TREND-UK is a working group of diabetes nurses with different skills and backgrounds, set up in 2009 in response to a request by the diabetes tsar at that time for a collective voice that represented all diabetes nursing groups. The original founding co-chairs of TREND-UK were experienced nurse consultants, working in a variety of settings and closely involved with most of the organisations representing nurses working with people with diabetes. TREND-UK has produced a number of resources for nurses and people with diabetes, available on [www.trend-uk.org](http://www.trend-uk.org). Registration to access these is free of charge and available to anyone interested in caring for people with diabetes as well as those with the condition.

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## BACKGROUND



The number of people with diabetes in the UK is rapidly increasing; the majority of these will have Type 2 diabetes. There are estimated to be 4.7 million in the UK with diabetes, of which, approximately 1 million have yet to be diagnosed. It is predicted that by 2025 over five million people will have the condition.

People with diabetes are prone to long term micro vascular and macrovascular complications such as retinopathy, nephropathy, diabetic foot disease and cardiovascular disease. The cost to the NHS for diabetes care is estimated to be £10 billion accounting for 10% of the NHS budget annually. About 90% of people with diabetes have Type 2, about 8% of people with diabetes have Type 1 and about 2% of people have more rare types of diabetes.

Type 2 diabetes develops when the body still makes insulin but insufficient to maintain normal glucose levels and due to insulin resistance the insulin is less effective. Some people can manage to control their glucose levels with a healthy diet, regular physical activity and, if they need to, by losing weight. But the longer someone has type 2 diabetes, the more likely it is that they will need medication. About 25% of people with type 2 diabetes will eventually need insulin therapy.

If Primary Care health care professionals are to make a difference in delaying progression of long term complications they need to understand more about the condition and diabetes management including the use of insulin therapy where indicated. (Facts and stats Update, Diabetes UK, 2019) see [www.diabetes-uk.org](http://www.diabetes-uk.org) accessed April 2019

Currently around 20 – 30% of all people with diabetes in the UK are insulin treated. It is estimated that approx. one million people use injectable therapies (includes insulin and GLP-1 RA) to treat their diabetes. Between 1991 and 2010 the number of

UK insulin users trebled. Nearly £477 million was spent on anti-diabetic drugs in 2017-18 (Holden SE et al. 2014). Over the same year, around £350 million was spent on insulin, and £181 million on diagnostic and monitoring devices. [www.bbc.co.uk/health/november2018](http://www.bbc.co.uk/health/november2018) accessed August 2019.

Type 2 diabetes progresses over time irrespective of efforts to control blood glucose. The proportion of people with diabetes achieving glycaemic control with monotherapy declines over time due to beta cell failure. Even using a stepwise algorithm for oral diabetes medication fails to control glucose excursions after time. This is when injectable therapies may need to be considered.

Historically, specialist teams working within the local hospital or within the community usually initiated insulin therapy. However, primary care structures have changed with healthcare professionals (HCP) gaining new skills. Many General Practitioners and Practice Nurses have specialised in diabetes care within practices. Primary Care is able to provide a better experience if the HCPs who have been supporting the individual through diagnosis and progression are still involved in this important time when injectable therapy is indicated. It is important that HCPs supporting people commencing insulin therapy have the necessary skills and competence to do this safely and effectively no matter where they are located. Women with diabetes or Gestational diabetes will always need be managed in Specialist care.

## HCP Competency

TREND-UK recommends that any HCP considering commencing initiation of basal insulin should attend one of the available courses to gain the relevant skills and knowledge to undertake this transition in care. These recognised courses are:

- MERIT accessed via Novo Nordisk at [www.novonordisk.com](http://www.novonordisk.com)
- TOPICAL accessed via Lilly Diabetes at [www.lilly.com](http://www.lilly.com)
- PITSTOP accessed via [pitstopdiabetes.co.uk](http://pitstopdiabetes.co.uk)

Insulin therapy for people with type 2 diabetes should only be initiated and managed by healthcare professionals with the relevant expertise and training. The benefits and risks of insulin therapy should be discussed with the person so that they can make an informed choice. If insulin adjustment is required, it should only be done by HCPs with the relevant expertise and training (NICE, 2016).

The development of this best practice guide is to support Primary Care HCPs to navigate insulin initiation at a basic level. This will act as an aide memoire to commencing basal insulin when oral medication is no longer able to maintain blood glucose levels within the individual's target range.

**⚠ It is crucial that a person requiring insulin initiation is supported by a significant others during insulin initiation, wherever possible.**

## Rationale for involving the person with diabetes

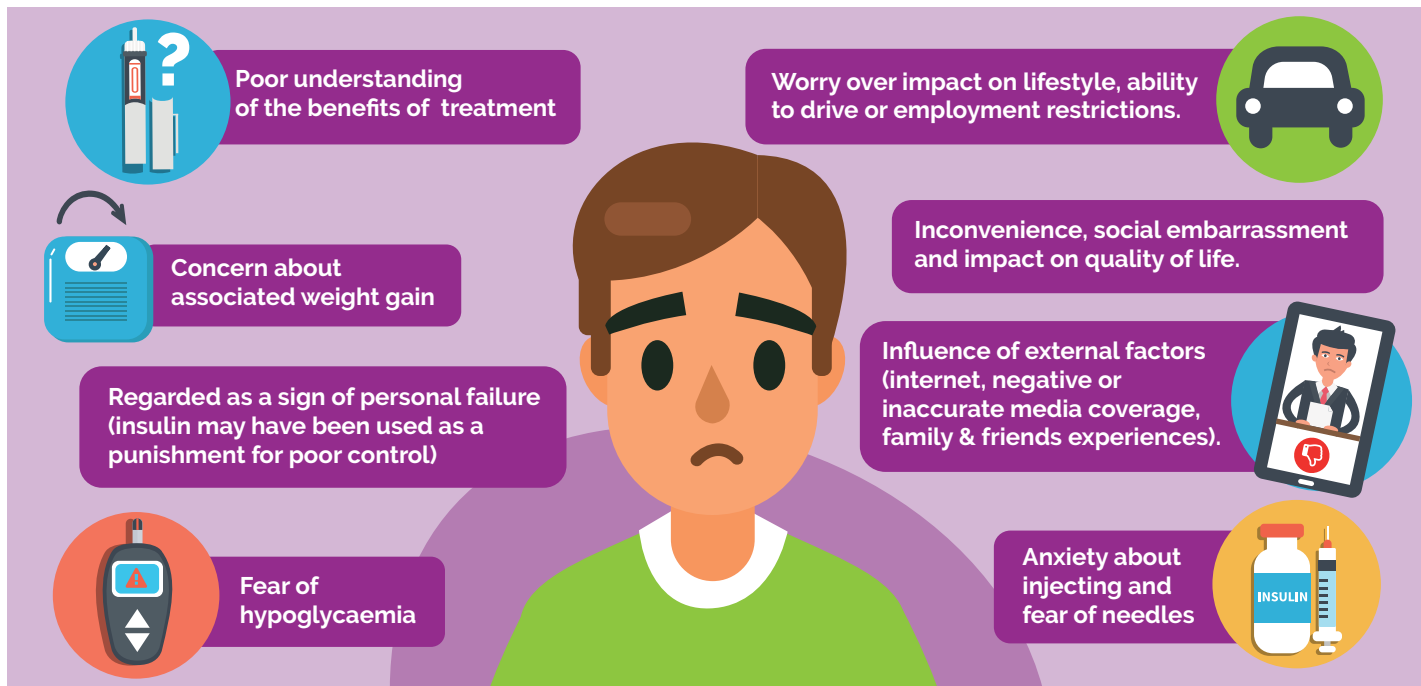
Where the person is involved in the decision to start insulin, including which regimen and which device, they are more likely to feel in control. Recognition that they are being given this responsibility may lead to greater engagement in self-care, build confidence and improve the injection experience (Polonsky, WH et al, 2017).



# PRE-INITIATION OF BASAL INSULIN

## Assess willingness to accept insulin therapy

There are many reasons why a person may be reluctant to start insulin therapy including:



Most of these barriers can be overcome with support from a trusted HCP but it helps to discuss the possibility of requiring insulin early to allow time for the person to properly consider the implications for them and provide sufficient opportunity to allay fears and dispel any myths they hold about insulin.

## Establish regular blood glucose monitoring

Blood glucose monitoring plays a vital role in selecting the most appropriate regimen, determining dose requirements and guiding dose titration, measuring efficacy and identifying hypoglycaemia. The ability to self-monitor blood glucose should be established prior to insulin initiation where this monitoring method is intended.

Encourage the person to keep a blood glucose diary – not only will this provide a useful blood glucose profile and insight into the impact of food choices but it will help establish regular self-monitoring and build confidence before insulin is started.

Refer to TREND-UK Blood glucose monitoring guidelines consensus document: [www.trend-uk.org/wp-content/uploads/2017/05/170131-TREND\\_BG\\_ONLINE.pdf](http://www.trend-uk.org/wp-content/uploads/2017/05/170131-TREND_BG_ONLINE.pdf)



# INITIATION OF BASAL INSULIN

## Decide on the preferred insulin and device

No single insulin type or regimen suits everyone - all insulin treatment needs to be tailored to the individual. Many factors may influence choice of insulin regimen in type 2 diabetes including individual's preferences, their lifestyle, manual dexterity and capacity and these should all be considered prior to the initiation consultation.

Basal insulins are most commonly used in combination with one or two non-insulin glucose lowering agents. When starting insulin therapy in adults with type 2 diabetes, continue to offer metformin for people without contraindications or intolerance. Review the continued need for other blood glucose lowering therapies. Sulphonylureas should be stopped when mealtime insulin is added but are likely to need to be continued in conjunction with basal insulins to provide mealtime cover.

Once or twice daily basal insulins are commonly used as first-line insulin treatment for people with type 2 diabetes, with or without other non-insulin diabetes medications.

Currently NICE recommend the following:

- Offer NPH insulin injected once or twice daily according to need.
- Consider starting both NPH and short-acting insulin (particularly if the person's HbA1C is 75 mmol/mol [9.0%] or higher), administered either: separately or as a pre-mixed (biphasic) human insulin preparation.
- Consider, as an alternative to NPH insulin, using insulin detemir or insulin glargine if:
  - the person needs assistance from a carer or healthcare professional to inject insulin, and use of insulin detemir or insulin glargine 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.
- 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:
  - a person prefers injecting insulin immediately before a meal, or
  - hypoglycaemia is a problem, or
  - blood glucose levels rise markedly after meals (NICE NG28, 2015)

**⚠ This best practice pathway is intended for individuals in whom a basal insulin regimen has been agreed. Only proceed where this decision has been made.**

The table below lists basal insulins currently available in the UK.

			Approx onset	Approx peak	Approx duration
<b>INTERMEDIATE ACTING BASAL INSULINS [HUMAN/ Neutral Protamine Hagedorn (NPH)]</b>					
	Insuman Basal®	45-60 mins before food	<1 hour	3 - 4 hrs	11 - 20 hrs
	Insulatard®	Once or twice daily; not food dependent	<1.5 hrs	4 - 12 hrs	24 hrs
	Humulin I®	Once or twice daily; not food dependent	30 - 60 mins	1 - 8 hrs	22 hrs
<b>LONG ACTING BASAL INSULINS [ANALOGUE]</b>					
INSULIN GLARGINE 100 units/ml	Semglee®	Once daily at the same time; not food dependent	30 - 60 mins	No peak	24 hrs
	Abasaglar®	Once daily at the same time; not food dependent	30 - 60 mins	No peak	24 hrs
	Lantus®	Once daily at the same time; not food dependent	30 - 60 mins	No peak	24 hrs
INSULIN DETEMIR	Levemir®	Once daily at the same time or twice daily 12 hrs apart; not food dependent.	30-60 mins	No peak	24 hrs
<b>ULTRA LONG ACTING BASAL INSULINS [ANALOGUE]</b>					
INSULIN GLARGINE 300 units/ml	Toujeo®	Once daily at the same time; not food dependent	30 - 60 mins	No peak	24 - 36 hrs
INSULIN DEGLUDEC	Tresiba®U100 Tresiba®U200	Once daily at the same time; not food dependent	30-90 mins	No peak	Beyond 42 hours

## Intermediate-acting (NPH) insulin

Intermediate-acting (NPH) insulin may be given once- or twice-daily.

Where intermediate-acting (NPH) insulin is given once-daily the best time to administer it is in the evening or before bed. When given at bedtime it will predominately target fasting hyperglycaemia and is therefore most useful when blood glucose levels are high overnight and in the morning.

Reasons to consider long-acting analogue include:

- Would otherwise need twice daily NPH.
- Person needs assistance with injecting (ie district nurse) and would benefit from longer duration of action.
- Experiencing problematic nocturnal hypoglycaemia (though could opt for morning dosing of human NPH insulin) NICE 2015.

Key factors to consider when choosing the most appropriate injection device include:

- Ease of use including
  - Injection pressure
  - Device "reach" at high doses, i.e. is the end of the injection button within thumb reach with the dose dialled up?
  - Changing cartridges in durable devices
- Handling
  - Size, shape, weight
  - - Consider eyesight and manual dexterity
- Individual device preference
  - Durable vs. pre-filled
- The maximum amount of insulin that can be injected at one time

Disposable insulin pens come pre-filled with insulin. As the name implies, the pen is discarded when the insulin is used up.

Reusable or durable insulin pens are loaded with a new insulin cartridge when the old one is used up. Cartridges come in packs of five with each cartridge containing 100 units per mL, a total 300 units in 3 mL in a cartridge – the same volume contained in most (but not all) pre-filled disposable pens.

The cartridges must always be used with the durable pen recommended by the same manufacturer.

Insulin pens can be used to give up to 50, 60, 80 or 160 units typically in 1-unit increments though some pens will give doses in 0.5-unit increments and others in 2-unit increments.

## What are biosimilars?

A biosimilar medicine is a biological medicine which is highly similar to another biological medicine already licensed for use. Biosimilars has been shown not to have any clinically meaningful differences from the originator biological medicine in terms of quality, safety and efficacy (NICE KTT15, 2016). Semglee (Insulin glargine) , Abasaglar (Insulin glargine) and Insulin Lispro Sanofi are the biosimilar insulins available in the market.

Biosimilar medicines have the potential to offer the NHS considerable cost savings and widen the access to innovative medicines. Setting a precedent, a NICE review of the use of human growth hormone when a biosimilar is available

recommends that *'the choice of product should be made on an individual basis after informed discussion between the responsible clinician and the individual and/or their carer about the advantages and disadvantages of the products available, taking into consideration therapeutic need and the likelihood of adherence to treatment. If, after that discussion, more than one product is suitable, the least costly product should be chosen.'* (NICE TA188, 2016)

Durable (Reusable) Pens	
NovoPen® 5	Dials a maximum of 60 units and uses 3-mL cartridges manufactured by Novo Nordisk.  Available for use with Insulatard® and Levemir® Penfill® cartridges.
ClikSTAR®	Dials a maximum of 80 units and uses 3-mL cartridges manufactured by Sanofi.  Available for use with Lantus® and Insuman® Basal cartridges.
HumaPen® Savvio™	Dials a maximum of 60 units and uses 3-mL cartridges manufactured by Lilly.  Available for use with Humulin® I and Abasaglar® cartridges.
Pre-filled (Disposable) Pens	
SoloSTAR®	Dials a maximum of 80 units and contains 300 units of insulin  Available for use with Lantus® and Insuman® Basal.
SoloSTAR® for Toujeo®	Dials a maximum of 80 units but contains 450 units of insulin in 1.5mL
DoubleSTAR® for Toujeo®	Recommended for those on at least 20 units of basal insulin. Dials 2-160 units in 2-unit increments.  Each pen contains 900 units of insulin in - If a person using this insulin is visually impaired they must be made aware of this.
FlexPen®	Dials a maximum of 60 units and contains 300 units of insulin.  Available for use with Levemir®.
FlexTouch®	Dials 80 units (except Tresiba® U200 which dials 160 units)  Available for use with Tresiba® 100 units/mL and Tresiba® 200 units/mL.
KwikPen™	Dials maximum of 60 units and contains 300 units of insulin.  Available for use with Humulin® I and Abasaglar®
InnoLet®	Dials a maximum of 50 units and contains 300 units  Available for use with Insulatard® and Levemir®.
Semglee®	Dials maximum 80 units and contains 300 units of insulin  Available for use with Semglee®

Insulin pens are not all the same. Clear instructions accompany all insulin pen devices but it is important to demonstrate how each device works and then let the person handle the device to personally assess ease of use. Giving the person the opportunity to perform a "dummy" injection (where a needle is attached to an empty durable pen device, the dose dialled and the needle inserted into the skin but the dose button NOT depressed and nothing injected) is advisable to confirm understanding, and competency and is very reassuring for those who have never self-injected before and understandably feel anxious.

Disposable pen needles must be prescribed separately. Ensure single use only advised. Follow local guidance for preferred and most cost-effective brands.

For insulin to work effectively it should be injected into the subcutaneous tissue. This is the fatty layer that lies just below the skin but above the muscle layer. A 4mm needle will deliver insulin into the right place, regardless of BMI or weight using the technique described here. When longer needles are used there is a risk that the insulin will be delivered into muscle where it is likely to be absorbed more quickly.

## Teach correct injection technique

**⚠ How insulin is injected is as important as what is injected.**

**📄 Refer to Best Practice Guideline to support Correct Injection Technique in Diabetes Care: <https://bit.ly/2nBBZoq>**

### Storage of insulin

Unopened insulin is stable until the expiry date stated on the box, when stored in a refrigerator at 2 - 8°C. Store in the fridge door or top shelf to prevent cross-contamination from other food items. Once opened insulin is stable at room temperature (below 25°C) for 28 or 42 days (dependent on manufacturer) providing it is stored away from direct heat and light. Never freeze insulin. Cold insulin may take longer to absorb and cause stinging. Therefore, if in-use insulin is taken directly out of the fridge, it may help to allow it to stand for up to 30 minutes to come up to room temperature before use.

### Preparing and administering injections

Reliable absorption of insulin is dependent on some key factors:

**Injection depth** – insulin should be injected into the subcutaneous tissue and this is most reliably delivered by using a 4mm needle.

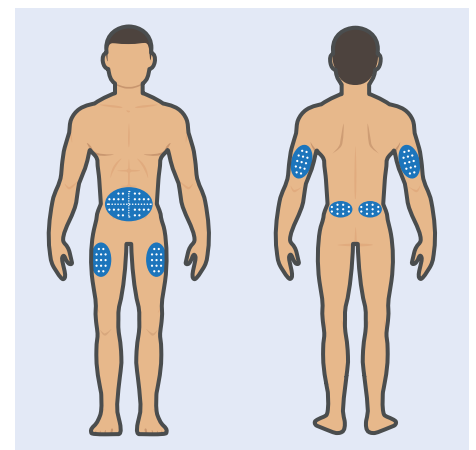
**Site selection** – the speed of absorption of NPH insulin can vary according to the site it is injected into. The thighs and buttocks are the preferred sites for Neutral Protamine Hagedorn (NPH) insulin where absorption is slowest. Absorption rates do not vary between different sites for basal analogues.

### Choosing an injection site

The recommended sites for injecting are:

- ✔ Across the abdomen
- ✔ Upper outer area of the thighs
- ✔ Upper outer area of the buttocks
- ✔ The underside of the upper arm

**Rotation of the injection site** is essential to reduce the risk of lipohypertrophy. Insulin injections should be systematically rotated within the same area (e.g., dividing the areas in quadrants or halves, rotating sites in the same direction and then rotating quadrants each week)



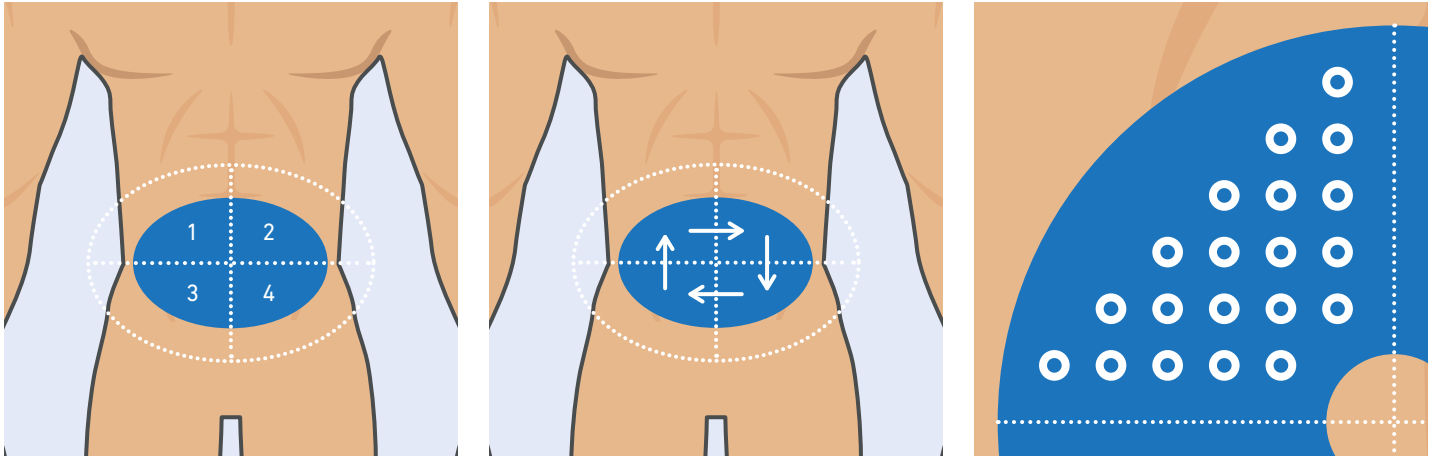


### Why it is important to rotate injection sites

Repeatedly injecting insulin into the same place can cause 'rubbery' lumps below the skin.

To reduce the risk, try to inject into a different place within your chosen site for every injection.

- ✔ Divide injection site into halves or quadrants and use a different half or quarter every week.
- ✔ Try to rotate the injections within that area – move injections in a clockwise or anticlockwise direction spacing each injection at least 1cm apart from the previous one.
- ✔ Don't forget to check for lumpy areas or bruising before injecting and avoid these areas.



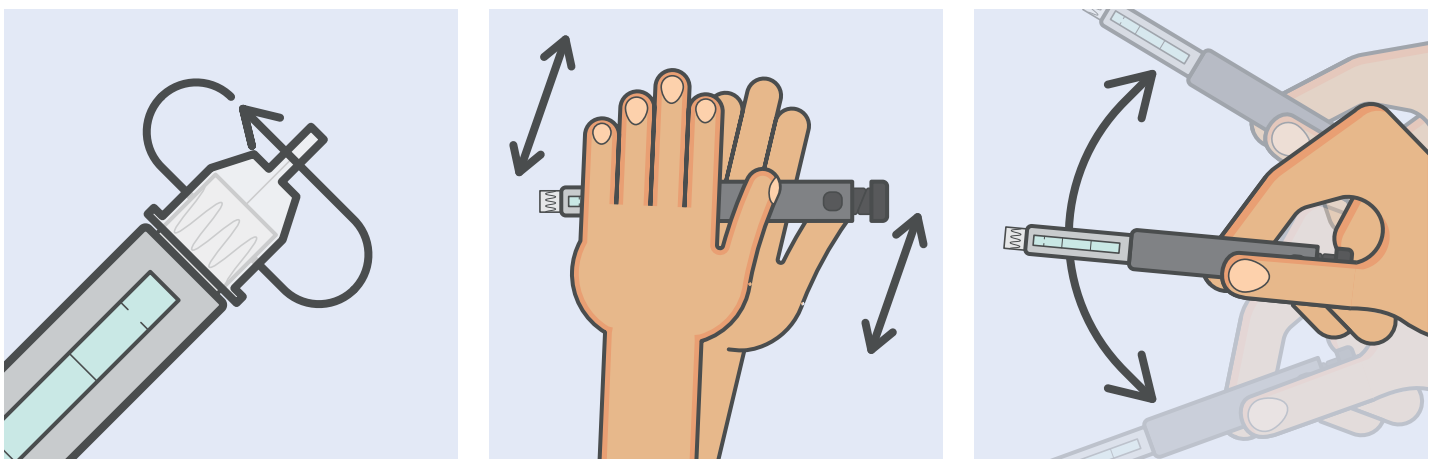
Injection sites should be inspected and palpated by the individual prior to injection. Avoid using a site showing signs of lipohypertrophy (a build-up of subcutaneous fat tissue at a site where insulin has been injected continuously), inflammation, oedema or infection until the problem has been resolved.

### Re-suspension of insulin

Cloudy insulins such as Insuman Basal®, Insulatard® and Humulin I® must be thoroughly mixed ("re-suspended") before use.

To correctly re-suspend insulin:

- ✔ Remove pen cap
- ✔ Roll the pen 10 times between the palms.
- ✔ Then gently invert the pen 10 times to achieve an even milky appearance.



## Attaching a needle

To attach a needle to a pen:

- ✔ Remove the pen cap.
- ✔ Pull off the paper tab.
- ✔ Most needles screw onto the end of the pen although for others you push and turn until it firmly attached to secure the needle.
- ✔ Pull off both needle caps (some needles have just one outer cap).

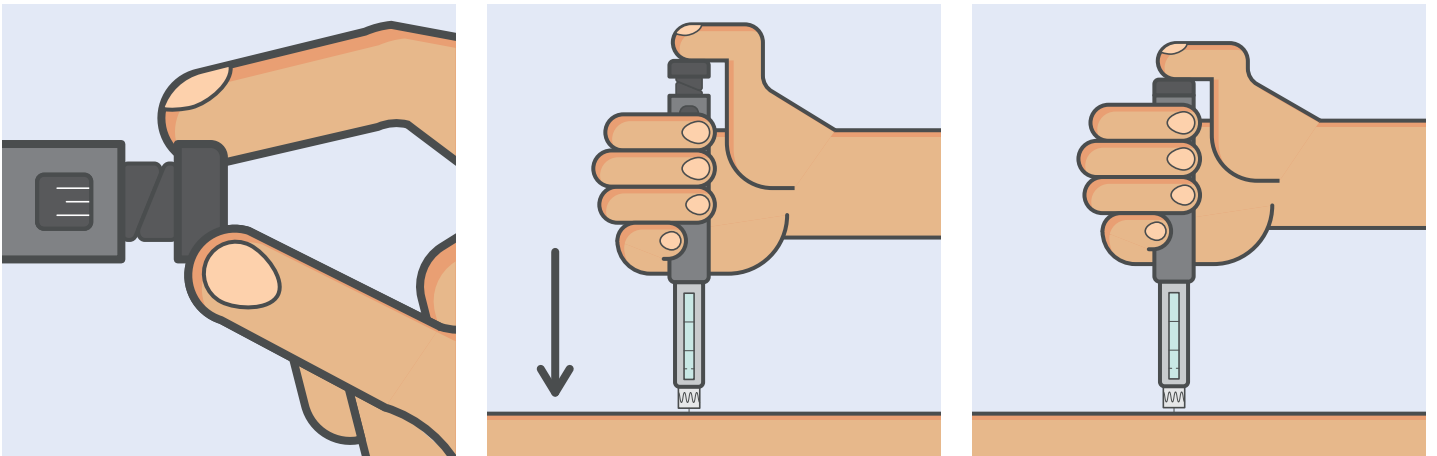
## Priming the pen

Always prime the pen to check the needle is not blocked and the pen is working correctly.

- ✔ Turn the dose selector to select 2 units.
- ✔ With the needle pointing upwards press and hold the dose button.
- ✔ Check that a drop appears at the tip of the needle. If this is not seen repeat the steps until insulin is seen at the needle tip.

## Dialling the dose

- ✔ Turn the dose selector to select the number of units required (usually this will appear in a small window).



## Injecting

- ✔ Fully insert the needle into the skin at 90 degrees keeping the pen stable.

It is not necessary to swab the injection site with alcohol as this hardens the skin and does not remove the surface bacteria. Furthermore, the antiseptic may cause irritation and discomfort by being injected into the tissue. Skin should be physically clean.

- ✔ Press the dose button until the dose is fully injected.
- ✔ Count to 10 before removing the needle from the skin to ensure the full dose is delivered.
- ✔ Safely remove the needle from the pen and dispose of the needle into a sharps bin.

Always use a new needle for each injection. This is what all manufacturers recommend. Re-used needles become blunt and jagged and lose their lubrication and this can lead to a more painful injection as well as increase the risk of lipohypertrophy. Lipohypertrophy may lead to erratic absorption of the insulin, which will cause wide variation in blood glucose levels.

Provide a Sharps Bin for safe disposal of all sharps including pen needles and lancets (according to local policy).

## Issue Insulin Passport

Following recommendations from the National Patient Safety Agency (NPSA/2011/PSA003) since 2012 every person over the age of 18 should be offered an 'Insulin Passport' and patient information booklet detailing known error-prone situations and actions that may minimise harm (NPSA 2011).

Insulin users should be encouraged to carry their Insulin Passport with them so that the information is available in an emergency and to show it to health professionals to confirm details of their current insulin therapy. All the insulin companies produce insulin safety cards corresponding to their insulins free of charge.

Some insulins have very similar names and in some cases the packaging can look similar but their modes of action are different. You need to be sure that you are prescribing the correct insulin for the individual

### **⚠ Always prescribe insulin by the brand name**

Individuals should always check that they have been prescribed and dispensed the correct insulin against their prescription list from their GP.

## Define starting dose of insulin

A safe starting dose of insulin for most individuals is 10 units a day or 0.1- 0.2 units per kg weight a day. (Davies et al. 2018)

## When to administer insulin

Decide when to administer the insulin. NPH insulin has a shorter duration of action than basal analogue insulins and may need to be given twice daily.

## Agree appropriate blood glucose target

Targets for self-blood glucose monitoring should be agreed with the individual and take into account age, infirmity, co-morbidities and other relevant clinical factors.

### **⚠ Glucose targets should be individualised**

Individuals should be encouraged to achieve their target and maintain it unless this results in adverse effects (including hypoglycaemia) or impairs their quality of life.

## Agree a dose adjustment schedule

Insulin dose adjustment should be guided by regular and targeted blood glucose monitoring. Most individuals can be taught to self-titrate basal insulin doses according to their self-monitored blood glucose levels. A clear titration algorithm will support self-titration.

- Recommend individual to check fasting blood glucose (before breakfast) every day.
- It may be appropriate to aim for a fasting blood glucose of between 5 – 8 mmol/L.
- However, in some individuals including elderly or frail, those with renal impairment (CKD 4-5) and/or those with reduced hypo-awareness then a more relaxed target is appropriate.
- Avoidance of hypoglycaemia SHOULD ALWAYS take priority over achieving targets.
- Where 'hypos' are a problem the dose should be decreased by 20%.
- In end of life care the aim is for the individual to be free from osmotic symptoms; if blood glucose testing aim for readings of 6-15 mmol/L.
- Check ketones if blood glucose levels are >15 mmol/L and at lower blood glucose levels if unwell and taking an SGLT2 inhibitor.

Generally, doses should be increased by 10% increments according to recorded fasting blood glucose levels. Other than for unexplained hypoglycaemia AVOID changing insulin doses based on one-off blood glucose levels and instead review blood glucose patterns over several days. **Before adjusting doses, consider diet, activity levels, injection technique and presence of lipohypertrophy.**

For those individuals willing and able to self-titrate an easy to follow method is to advise them to increase the dose by 2 units every 3 days where 3 consecutive fasting blood glucose levels are above target. (Riddle et al. 2003).

### **📌 Refer to Appendix 1 for examples of titration guides.**



## Hypoglycaemia

For further information and guidance on managing hypoglycaemia refer to Trend-UK (2018) Hypoglycaemia in Adults In The Community: Recognition, Management and Prevention.

### Treating Hypoglycaemia

- In adults who are conscious, orientated and able to swallow give 15-20 g quick-acting carbohydrate e.g.
  - 60 mls Gluco juice
  - 200 ml (a small carton) of smooth orange juice
  - 5 or 6 dextrose tablets
  - 5 large jelly babies
  - 7 large jelly beans
  - Two tubes of 40% glucose gel inserted slowly into the buccal cavity if the person is unable or unwilling to take other oral treatments (but only if person is able to swallow).
- After 5-10 minutes if glucose level is still less than 4 mmol/L, repeat. If the person does not feel better (or if the blood glucose level is still less than 4 mmol/L) after 15 minutes, repeat to a maximum of three treatments. If after three treatments the blood glucose is still low, seek urgent medical advice.
- When the individual feels better and if they are not due to eat a meal (which should contain carbohydrate), they should eat a small starchy snack such as a banana, a slice of bread or 2 plain biscuits, and be monitored afterwards.

## Driving

**i** Refer to DVLA Guidance for Medical Professionals: [www.gov.uk/government/publications/assessing-fitness-to-drive-a-guide-for-medical-professionals](http://www.gov.uk/government/publications/assessing-fitness-to-drive-a-guide-for-medical-professionals)

### By law, persons treated with insulin must inform the DVLA.

The DVLA must also be informed if the person experiences any of the following:

- More than one episode of severe hypoglycaemia\* within the last 12 months while awake (for Group 2 drivers a single episode of severe hypoglycaemia must be reported immediately).
- Medical team report a high risk of developing severe hypoglycaemia.
- Develop impaired awareness of hypoglycaemia (difficulty in recognising the warning symptoms of low blood sugar).
- Suffer severe hypoglycaemia while driving. (Severe hypoglycaemia is defined as hypoglycaemia requiring another person's assistance).

**Group 1 drivers** - episodes of hypoglycaemia occurring during established sleep are no longer considered relevant for licensing purposes, unless there are concerns regarding their hypoglycaemia awareness.

**Group 2 drivers** - must report all episodes of severe hypoglycaemia including sleep episodes.



Impaired awareness of hypoglycaemia' for Group 1 drivers is defined as 'an inability to detect the onset of hypoglycaemia because of total absence of warning symptoms'. Group 2 drivers must have full awareness of hypoglycaemia. Drivers MUST comply with the DVLA's self-monitoring requirements for insulin-treated drivers ([www.gov.uk/diabetes-driving](http://www.gov.uk/diabetes-driving)). More frequent testing may be required during intercurrent illness and when there is risk of hypoglycaemia.

Flash glucose monitoring may be used for monitoring glucose at times relevant to driving. Group 1 vehicles but users must also carry finger prick capillary glucose testing equipment for driving and a finger prick blood glucose reading MUST be taken in the following circumstances:

- When the glucose level is 4.0 mmol/L or below.
- When symptoms of hypoglycaemia are being experienced.
- When the glucose monitoring system gives a reading that is not consistent with the symptoms being experienced (eg symptoms of hypoglycaemia and the system reading does not indicate this) - see the INF294 leaflet for further details.

**Group 2:** There is a legal requirement for Group 2 drivers to monitor their blood glucose for the purpose of Group 2 driving. Flash glucose monitoring systems are not permitted for the purposes of Group 2 driving and licensing. Group 2 drivers who use these devices must continue to monitor finger prick capillary blood glucose levels.

#### Important Advice to give drivers:

- Carry your blood glucose meter and blood glucose strips in car.
- Check your blood glucose level before driving and on long journeys stop every 2 hours to recheck.
- Take a snack before driving if blood glucose is 5 mmol/L or less.
- Do not drive if feeling hypoglycaemic, or if blood glucose is less than 4 mmol/L.
- If a hypo develops whilst driving, stop the vehicle as soon as possible in a safe location.
- Treat the hypoglycaemia and do not resume driving until 45 minutes after blood glucose has returned to normal. It takes up to 45 minutes for the brain to recover fully.
- Keep an emergency supply of fast-acting carbohydrate such as glucose tablets or sweets in the vehicle at all times within easy reach of the driver.
- Take regular meals, snacks and rest periods on long journeys, and always avoid alcohol.

 **For more information on driving download leaflet at** <https://bit.ly/2m5G2ck>

## Sick Day Guidance for People with Type 2 Diabetes on Basal Insulin

During intercurrent illness take carbohydrates as a meal replacement and sip sugar-free fluids (at least 100 mL/hour if able).

If blood glucose is:

- <13 mmol/L give normal insulin dose
- 13-17 mmol/L add 2 extra units to each dose
- 17-22 mmol/L Add 4 extra units to each dose
- >22 mmol/L Add 6 extra units to each dose

The above adjustments should be doubled for those taking a total daily dose of insulin >50 units and the doses reduced gradually as the illness subsides.

Test Blood Glucose at least every 4 hours. Seek further advice from GP or Diabetes Nurse if unsure.

 **If vomiting, unable to keep fluids down or unable to control blood glucose SEEK URGENT MEDICAL ADVICE.**

 **See Appendix 2 for Insulin Initiation Consultation Checklist**



# FOLLOW-UP

HbA1c levels should be measured at intervals of 3 months until glycaemic control is stable but insulin dose adjustment should always be guided by capillary blood glucose levels.

Ideally individuals should try to monitor blood glucose levels 4 x daily initially (scattering times of testing throughout day to include FBG as well as post-meal readings).

Avoidance of hypoglycaemia should always take priority over achieving individual blood glucose targets.

Self-monitored blood glucose levels should be reviewed within a few days of starting insulin.

Regular face-to-face or telephone support may be required in the first few days and weeks but should reduce as the individual's confidence grows. Individuals should be encouraged to bring a record of their daily blood glucose readings for review in the weeks following initiation. The level and frequency of support will vary depending on each individual's confidence level.

## Check the following at review:

- Check the current doses being administered
- Check timings of injections
- Check concordance
- Assess injection technique
- Review individual's treatment targets (based on self-monitoring results/glucose profiles)?
- Have doses been fully optimised/titrated?
- Have there been any episodes of hypoglycaemia (Dizzy do's - is there an identifiable cause & what action was taken)?
- Assess confidence to adjust doses/self-titrate/manage insulin doses during any intercurrent illness?
- Is there potential to improve diet and lifestyle?
- Review other glucose lowering medication (is there scope to add non-insulin therapies before adjusting insulin or current regimen)?
- Confirm that DLVA/Insurance Companies have been notified where required.



## Useful Tips

- For sustained physical activity throughout the day individuals may need to reduce their morning insulin dose by 25% or eat more that day.
- For night-time 'hypos' encourage pre-bed snack and reduce the evening insulin by 20%. A shorter-acting analogue mix may be better.
- Where blood glucose levels are erratic check injection sites for lipohypertrophy.
- Once daily regimens can result in post-prandial glucose spikes. The person may need to consider twice daily dosing or switching to a longer acting basal insulin. This decision will be guided by SMBG. Another option would be to intensify to an insulin regimen that includes meal-time insulin either with the addition of separate mealtime insulin or switching to a pre-mixed insulin regimen.

## Consider need to change regimen

Individuals on a basal insulin regimen should be monitored for the need for short-acting insulin before meals or a pre-mixed insulin preparation.

Indication to change regimen include:

HbA1C target not reached despite:


- Adequately titrated basal insulin, OR
- Basal dose  $>0.7-1$  unit per kg/weight, OR
- Fasting plasma glucose is at target but blood glucose levels rising after meals

## Education and Training

HCPs should refer to the competency statements set out in the TREND-UK guidance: An integrated Career and Competency Framework for Diabetes Nursing.

 [An integrated career and competency framework for diabetes nursing \(5th edition\) https://bit.ly/2mLa859](https://bit.ly/2mLa859)

The care of ten individuals receiving insulin could be audited every year to ensure that the care being delivered is of the highest standard.

 **Six Steps to Insulin Safety is a free module for all healthcare professional who EVER prescribe, prepare or administer insulin available at [www.cpd.diabetesonthenet.com](http://www.cpd.diabetesonthenet.com)**

## SUMMARY






This document has been developed by TREND-UK to address frequently asked questions on insulin initiation and titration, and it establishes simple and practical guidance for diabetes HCPs to enable effective initiation and titration of basal insulin, with the intent that it may translate to effective glycaemic outcomes in clinical practice to those new to insulin initiation in primary care in the future



## REFERENCES






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- Riddle M, Rosenstock J, Gerich J. The Treat-to-Target Trial. Randomized addition of glargine or human NPH insulin to oral therapy of type 2 diabetic patients Diabetes Care. 2003;26:3080-3086

## USEFUL RESOURCES

-  Blood glucose monitoring guidelines consensus document [http://trend-uk.org/wp-content/uploads/2017/05/170131-TREND\\_BG\\_ONLINE.pdf](http://trend-uk.org/wp-content/uploads/2017/05/170131-TREND_BG_ONLINE.pdf)
-  Best Practice Guideline to support Correct Injection Technique in Diabetes Care [https://trend-uk.org/wp-content/uploads/2018/11/ITM-Guideline\\_v9-FINAL-251018.pdf](https://trend-uk.org/wp-content/uploads/2018/11/ITM-Guideline_v9-FINAL-251018.pdf)
-  Hypoglycaemia in adults in the community: recognition, management and prevention (for healthcare professionals) [https://trend-uk.org/wp-content/uploads/2018/09/HCP\\_Hypo\\_TREND\\_FINAL.pdf](https://trend-uk.org/wp-content/uploads/2018/09/HCP_Hypo_TREND_FINAL.pdf)
-  An integrated career and competency framework for diabetes nursing (5th edition) <https://trend-uk.org/an-integrated-career-and-competency-framework-for-diabetes-nursing-5th-edition/>
-  Six Steps to Insulin Safety is a free module for all healthcare professional who EVER prescribe, prepare or administer insulin available at [www.cpd.diabetesonthenet.com](http://www.cpd.diabetesonthenet.com)

## DOWNLOADABLE RESOURCES FOR PEOPLE WITH DIABETES

All available to download free of charge from [www.trend-uk.org](http://www.trend-uk.org)

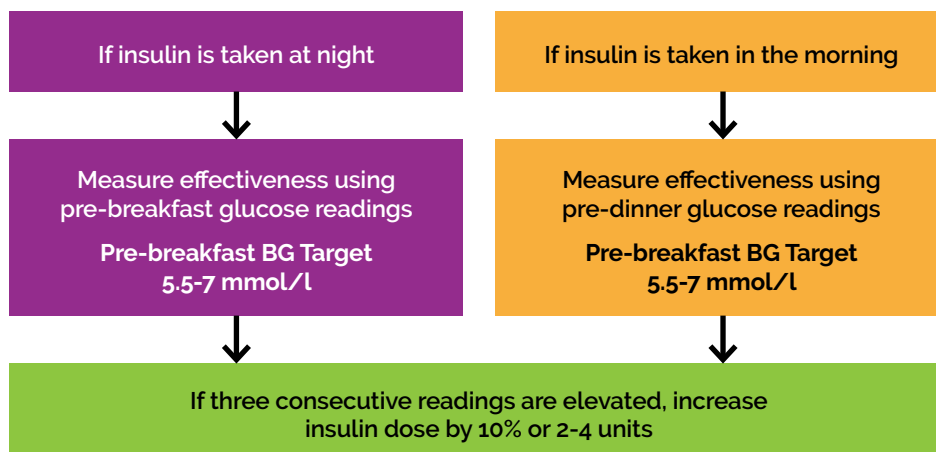
-  Keeping safe with insulin therapy [www.trend-uk.org/wp-content/uploads/2017/05/A5\\_Insulin\\_TREND\\_FINAL.pdf](http://www.trend-uk.org/wp-content/uploads/2017/05/A5_Insulin_TREND_FINAL.pdf)
-  Why do I sometimes feel shaky, dizzy and sweaty? Hypoglycaemia explained [www.trend-uk.org/wp-content/uploads/2019/07/A5\\_Hypo\\_TREND.pdf](http://www.trend-uk.org/wp-content/uploads/2019/07/A5_Hypo_TREND.pdf)
-  What to do when you are ill [www.trend-uk.org/wp-content/uploads/2018/12/A5\\_T2Illness\\_TREND.pdf](http://www.trend-uk.org/wp-content/uploads/2018/12/A5_T2Illness_TREND.pdf)
-  Safe Driving and the DVLA [www.trend-uk.org/wp-content/uploads/2019/05/A5\\_Driving\\_TREND.pdf](http://www.trend-uk.org/wp-content/uploads/2019/05/A5_Driving_TREND.pdf)
-  Injection technique Matters Best Practice Patient Toolkit can be downloaded at [www.trend-uk.org/wp-content/uploads/2018/11/ITM-Toolkit\\_Folder\\_ITM\\_A5\\_PLUS-2-1510.18-FINAL.pdf](http://www.trend-uk.org/wp-content/uploads/2018/11/ITM-Toolkit_Folder_ITM_A5_PLUS-2-1510.18-FINAL.pdf)



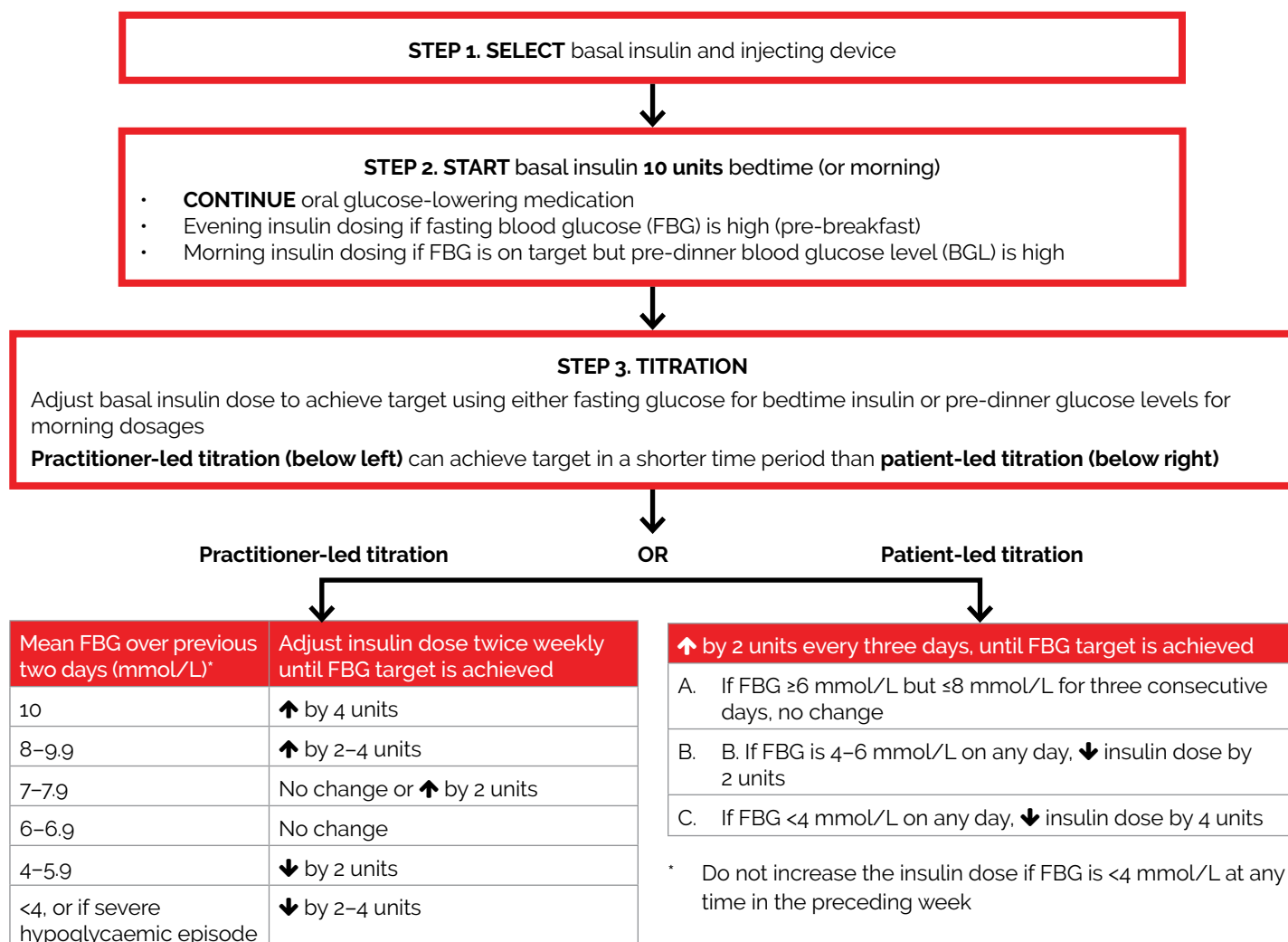
# APPENDIX 1: EXAMPLES OF TITRATION GUIDE FOR ADJUSTING BASAL INSULIN

## Adjusting basal insulin doses

Start basal insulin at agreed dose: (e.g. 10 units at bedtime and/or in morning if advised)



## Guide to starting and adjusting basal insulin



Source: [www.racgp.org.au/FSDEDEV/media/documents/Clinical%20Resources/Guidelines/Diabetes/General-practice-management-of-type-2-diabetes\\_1.pdf](http://www.racgp.org.au/FSDEDEV/media/documents/Clinical%20Resources/Guidelines/Diabetes/General-practice-management-of-type-2-diabetes_1.pdf)

## APPENDIX 2: INSULIN INITIATION CHECKLIST

- Which regimen - refer to factors that influence choice of insulin regimen and the benefits & limitations of each regimen.
- The type of insulin (e.g. is it mealtime or basal insulin or a mixture)
- The delivery device (taking account of manual dexterity/eye sight etc)
- Realistic expectations around efficacy (agreeing individual blood glucose targets)
- Explain action of insulin & timing of injections (especially in relation to meals)
- Concurrent medications (which diabetes lowering medications need to be stopped)
- Storage of insulin
- Reconstitution /re-suspension
- Sharps Bin supplied /Safe disposal of sharps discussed
- Injection Technique (needle size, changing needles, sharps disposal, site selection, giving an injection, site rotation, identifying & preventing lipohypertrophy) and booklet (e.g. Injection Technique Matters Toolkit)
- Self-monitoring of blood glucose (including interpreting & acting on the results)
- Titrating insulin dose to achieve agreed blood glucose targets
- Identifying, avoiding & treating hypoglycaemia (access to meter, snacks etc)
- Managing insulin and adjusting doses during intercurrent illness ('Sick Day Rules')
- Notification of DVLA, Insure and where required employer
- Impact of exercise
- Impact of alcohol
- Impact of different foods (especially carbohydrate awareness)
- Issue insulin passport and insulin safety booklet
- Continuing telephone support and out of hours support

### Additionally, where relevant:

- Travel advice
  - Take into account time zones. Injections taken further apart may not cause too many problems, but taken too close together may cause hypoglycaemia
  - Insulin should be carried in hand baggage
  - Diabetes ID card should be carried
  - Carry extra snacks
  - Travel insurance should cover diabetes and insulin treatment
- Fasting – advice should be given to avoid fasting in Ramadan if on insulin, but if determined to do so, support should be given

**i** For a complete list of insulins and delivery devices and up-to-date prescribing information refer to [www.bnf.org](http://www.bnf.org)

Refer to each insulin's specific summary of product characteristic (SPC) available at [www.medicines.org.uk](http://www.medicines.org.uk). Links to the SPC for basal insulins listed in this pathway:

Humulin I (Isophane) 100IU/ml	<a href="http://www.medicines.org.uk/emc/product/8194/smpc">www.medicines.org.uk/emc/product/8194/smpc</a>
Insulatard 100 international units/ml	<a href="http://www.medicines.org.uk/emc/medicine/3512/SPC/Insulatard+100+IU+ml,+Insulatard+Penfill+100+IU+ml,+Insulatard+InnoLet+100+IU+ml/">www.medicines.org.uk/emc/medicine/3512/SPC/Insulatard+100+IU+ml,+Insulatard+Penfill+100+IU+ml,+Insulatard+InnoLet+100+IU+ml/</a>
Insuman Basal 100 IU/ml	<a href="http://www.medicines.org.uk/emc/medicine/26468/SPC/Insuman+Basal+100+IU+ml+suspension+for+injection+in+a+cartridge/">www.medicines.org.uk/emc/medicine/26468/SPC/Insuman+Basal+100+IU+ml+suspension+for+injection+in+a+cartridge/</a>
Levemir 100 units/ml	<a href="http://www.medicines.org.uk/emc/product/5536/smpc">www.medicines.org.uk/emc/product/5536/smpc</a>
Lantus 100 units/ml	<a href="http://www.medicines.org.uk/emc/product/2376/smpc">www.medicines.org.uk/emc/product/2376/smpc</a>
Abasaglar 100 units/mL	<a href="http://www.medicines.org.uk/emc/product/6901/smpc">www.medicines.org.uk/emc/product/6901/smpc</a>
Semglee 100 units/ml ▼	<a href="http://www.medicines.org.uk/emc/product/9815/smpc">www.medicines.org.uk/emc/product/9815/smpc</a>
Toujeo 300 units/ml	<a href="http://www.medicines.org.uk/emc/medicine/30586">www.medicines.org.uk/emc/medicine/30586</a>
Tresiba 100 units/mL Tresiba 200 units/mL	<a href="http://www.medicines.org.uk/emc/product/7936/smpc">www.medicines.org.uk/emc/product/7936/smpc</a>



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