



How much insulin needs to be prescribed per month?

Over-prescribing repeat medication may ensure that a person does not run out of a vital medication, but there are cost implications for the NHS. It may also be difficult for the person to store larger quantities (particularly where a medication should be stored in a fridge). There is a risk of older medication expiring before it has been used and being thrown away or, potentially, used after the expiry date when it may not be safe or effective to do so.

It is difficult to determine how much insulin will be required for an individual at insulin initiation. Typically, insulin will be commenced at a modest starting dose (e.g. 6–10 units/day), and the dose uptitrated over several weeks until agreed target glucose levels are reached. With support, most individuals can safely and effectively self-titrate. Insulin requirements usually increase in the weeks following initiation.

For those individuals who adjust the amount of insulin they administer on a day-to-day basis, according to what they eat or their varying activity levels, it can be more difficult to predict how much insulin will be needed each month.

This guide is designed to help prescribers calculate how much insulin to prescribe each month for people **whose glycaemic control has stabilised**. However, it should **not** override the individual prescriber's own clinical judgement, and regular review of medication and dose is essential.

Key points

- Insulin calculations will be needed for each type of insulin being used.
- At times of sickness, infection, pregnancy or use of steroid treatment, more insulin may be required for that period.
- People with type 1 or type 2 diabetes who vary their insulin dose with meals will need enough to cover the average amount taken each month.

Higher-concentration insulins

Most insulin cartridges and pre-filled pens hold 300 units of insulin in 3 mL (i.e. an insulin concentration of 100 units/mL). Five cartridges or pre-filled pens are supplied in one box, giving a total of 1500 units. However, several higher-concentration insulins are now available, all presented in prefilled disposable pen devices. See **Box 1** (overleaf) for more information on the insulin concentration, number of units provided in a single pen device and the number of pens in a box.

Priming the insulin pen (performing an “air shot”)

Insulin pens should be primed according to the manufacturer's instructions* before each injection to ensure there is unobstructed flow and to clear needle dead space (Forum for Injection Technique, 2021). A new needle should be attached for every injection.

How to perform an “air shot”

- Turn the dose selector to 2 units
- Hold the pen with the needle pointing up and tap the pen gently a few times, which will move any air bubbles to the top
- Fully depress the delivery push button. A drop of insulin should appear at the tip of the needle. If a droplet is not seen, repeat the priming process
- Small air bubbles are normal and will not affect the dose
- A drop of insulin should be seen at the needle tip. If not, the process above should be repeated. If a droplet of insulin is not seen after a few attempts, a new needle should be attached.

The additional insulin required to allow for priming will vary depending on the frequency of injections; however, an air shot uses 2–3 units and it may sometimes take more than one air shot to prime the insulin pen.

*Most manufacturers recommend performing a 2-unit air shot; however, for Toujeo, the manufacturer recommends turning the dose selector until the dose pointer is at the mark between 2 and 4 (i.e. 3 units).

Pen needles



DON'T FORGET: Pen needles are not supplied with the cartridges or pens and need to be prescribed separately.

- A 4-mm pen needle inserted perpendicularly (at 90 degrees) is long enough to penetrate the skin and enter the subcutaneous tissue with little risk of intramuscular (or intradermal) injection. This is the safest option for

adults and children regardless of age, gender and BMI.

- Assessment of injection technique and examination of injection sites should be part of a regular face-to-face review
- For the latest guidance on injection technique, refer to the [The UK & IRE Injection and Infusion Technique Recommendations \(5th edition II\)](#)



The shelf-life of most unopened insulin vials, cartridges and pre-filled pens is 3 years but there may be a delay from date of manufacture to the date the insulin is dispensed. Therefore, users **must always** check the expiry date on each preparation before use.

Once opened, or after first use, any insulin remaining in a vial, cartridge or prefilled pen **should be discarded after 28 days**.

Calculating how much insulin to prescribe (28-day supply)

Remember to take account of the additional insulin required to allow for priming (see overleaf).

For simplicity, in **Table 1**, 12 extra units have been added to the total daily doses to cover priming up to three times a day, plus errors (except with Toujeo and Tresiba, which are only used as once-daily injections, and for which 6 extra units are added per day).

Formula

$$(\text{TDD} + \text{extra units for priming}) \times 28 \text{ [days]} = \text{[Monthly units required]}$$

$$\text{[Monthly units required]} \div \text{[No. of units in 1 pen]} = \text{[No. of pens required]} \Rightarrow \text{[round up]}$$

Worked example: TDD of 60 units, standard 100 units/mL pen (contains 300 units)

$$(60 + 12) \times 28 = 2016$$

$$2016 \div 300 = 6.62 \text{ pens} \Rightarrow \text{[rounded up to 7 pens]}$$

Splitting packs

Some pharmacies are willing to split packs of cartridges and pre-filled pens, although some people prefer their insulin to be in its original box. Where packs are split, the expiry date on every cartridge or pen should be clear and a patient information leaflet supplied.

Table 1. Amount of insulin required to prescribe per month according to daily dose.

Total daily dose	Standard insulin (100 units/mL, 300 units per pen)		Toujeo SoloStar (300 units/mL, 450 units per pen)		Toujeo DoubleStar (300 units/mL, 900 units per pen)		Tresiba FlexTouch (200 units/mL, 600 units per pen)		Humalog KwikPen (200 units/mL, 600 units per pen)	
	Pens needed	Boxes (of 5) needed	Pens needed	Boxes (of 3) needed	Pens needed	Boxes (of 3) needed	Pens needed	Boxes (of 3) needed	Pens needed	Boxes (of 5) needed
10 units	2*	1 [†]	1	1 [†]	Not recommended		1	1 [†]	Not recommended	
20 units	3	1 [†]	2	1 [†]	1	1 [†]	2	1 [†]	2	1 [†]
30 units	4	1 [†]	3	1	2	1 [†]	2	1 [†]	2	1 [†]
40 units	5	1	4	2 [†]	2	1 [†]	3	1	3	1 [†]
50 units	6	2 [†]	4	2 [†]	2	1 [†]	3	1	3	1 [†]
60 units	7	2 [†]	5	2 [†]	3	1	4	2 [†]	4	1 [†]
70 units	8	2 [†]	6	2	3	1	4	2 [†]	4	1 [†]
80 units	9	2 [†]	6	2	3	1	5	2 [†]	5	1
90 units	10	2	If over 80 units/day, suggest switching to DoubleStar		3	1	5	2 [†]	5	1
100 units	11	3 [†]			4	2 [†]	5	2 [†]	6	2 [†]
110 units	12	3 [†]			4	2 [†]	6	2	6	2 [†]
120 units	13	3 [†]			4	2 [†]	6	2	7	2 [†]
130 units	14	3 [†]			5	2 [†]	7	3 [†]	7	2 [†]
140 units	15	3			5	2 [†]	7	3 [†]	8	2 [†]
150 units	16	4 [†]			5	2	8	3 [†]	8	2 [†]
Up to 180 units	17–18	4	6	2	8–9	3	9	2 [†]		

*Number of pens has been rounded down; however, individuals who are on three daily injections and who have priming misfires could potentially run out of insulin by 28 days. These people should be advised to reorder early if they think they might run out.

[†]This number of boxes will last over 1 month, so the user should be reminded to only order when needed.

Reusable pens

Reusable pens for use with 3 mL cartridges should not be on repeat prescription. A maximum of two should be issued (in case the one in use becomes faulty). They can last for many years if looked after carefully.

Box 1. Higher-concentration insulins.

Toujeo® 300 units/mL

Toujeo 300 units/mL is available in a SoloStar® pen, prefilled with 450 units of insulin, with three pens supplied per box (a total of 1350 units); and a DoubleStar® pen, prefilled with 900 units of insulin, with three pens supplied per box (a total of 2700 units).

Humalog® 200 units/mL

Humalog 200 units/mL provides higher-concentration Humalog in a KwikPen device, prefilled with 600 units of insulin, with five pens supplied per box (a total of 3000 units).

Tresiba® 200 units/mL

Tresiba 200 units/mL provides higher-concentration Tresiba in a FlexTouch pen, prefilled with 600 units, with three pens supplied per box (a total of 1800 units).

The advantage of a higher-concentration insulin is that a smaller volume of solution is injected, making the injection process easier. These insulins are typically reserved for individuals on larger doses of insulin.