

Macleod Diabetes & Endocrine Centre Royal Devon & Exeter Hospital

Starting Insulin In Type 2 Diabetes

This is a brief guide which we hope will be useful when starting insulin in type 2 diabetes.

When should insulin be started?

NICE recommend when HbA1c $\geq 7.5\%$ or other level agreed with individual. Because HbA1c can vary from month to month, we do not start insulin after a single measurement just above this threshold. Instead, we suggest revisiting diet and lifestyle measures and reassessing after 3 months.

In frail or elderly patients, the risk of hypoglycaemia may outweigh the benefits of tight control. An HbA1c of 8-8.5% is a reasonable target. In patients with a terminal diagnosis, symptom control should be the priority, and tight glycaemic control is unlikely to benefit the patient.

Starting isophane (NPH) insulin before bed

Recommended for most patients above target on maximum tolerated metformin and sulphonylurea.

Exceptions

- Bedtime insulin is less likely to succeed if HbA1c very high (e.g. $>10\%$). However, it is still reasonable to try bedtime insulin first and switch to twice daily if unsuccessful.
- Bedtime insulin is less likely to succeed if hyperglycaemia is predominantly in the afternoon and evening. However, it is still reasonable to try bedtime insulin first unless fasting blood glucose measurements are already consistently <7 mmol/L.

Oral diabetes drugs

- Usually, continue both metformin and sulphonylurea at current doses. If patient wishes to stop one or other, it is more likely that twice daily insulin will be needed.
- Stop other drugs, e.g. pioglitazone, sitagliptin etc, unless advised by specialist.

Choice of insulin

- **Usually** Insulatard or Humulin I. These are commonly called "isophane" or "NPH" insulins.
- **Very rarely**, Lantus or Levemir for patients who have already experienced nocturnal hypos, or are at particular risk from night-time hypos. Otherwise, these insulins are expensive and of no extra benefit in type 2 diabetes.

Starting dose

- 10 units is our usual starting dose.
- More experienced clinicians may start higher, e.g. 0.1 to 0.2 units per kg bodyweight.

Blood glucose monitoring

- Fasting measurements every morning while the insulin dose is being adjusted.
- Less frequent testing, e.g. 2-4 per week, when the dose is stable.
- Pre-lunch, -evening meal and -bed measurements are helpful if HbA1c remains high.

Blood glucose targets

- Usually aim for fasting blood glucose <6 mmol/L if achievable without hypos.
- Be more cautious, e.g. <8 mmol/L or <10 mmol/L in frail or elderly patients.
- If fasting levels are very high, then it is reasonable to bring down to 10 mmol/L initially, and change to the lower target after 2-3 months.

Adjusting the insulin dose

- Most patients will end up on 30-70 units. Doses must be increased actively, otherwise titration could take months! Most patients can be advised to do this between visits.

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- Dose can be increased every three days, based on **average** of last three morning readings:
 - Increase by 2 units if average is above target.
 - Increase by 4 units if average is more than 4 mmol/L above target.
 - If the dose is already above 20 units, do not use 2-4 unit increases, but increase by 10% or 20% of current dose.
 - Do not increase dose if hypos occur, even if fasting readings remain above target.
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Starting twice-daily insulin

Consider switching to twice-daily insulin if:

- HbA1c remains high despite lowering fasting blood glucose with bedtime insulin. This implies hyperglycaemia in the afternoon or evening, which will require a morning dose of insulin.
- HbA1c remains high, and overnight hypos prevent further increases in bedtime insulin.

Consider starting twice-daily insulin from the outset if:

- HbA1c is very high (e.g. over 10%)
- Very high glucose readings (e.g. >15 mmol/L) are regularly seen in afternoon and evening.

Choice of insulin

- **Usually Insulatard or Humulin I** (commonly called “isophane” or “NPH” insulins).
- Mixed insulin, e.g. Humulin M3, may help if blood glucose readings are higher before lunch or before bed.
- Avoid Lantus or Levemir without good reason. Despite drug companies’ claims, they are more costly but not more effective than conventional insulins in type 2 diabetes.

Starting dose if new to insulin

- 10 units twice daily, before breakfast and evening meal, is a reasonable cautious dose.
- More experienced clinicians may start higher, e.g. 0.1 to 0.2 units per kg, twice daily.

Starting dose if already on bedtime insulin

- Reduce dose by 10%, then split this 2/3 before breakfast and 1/3 before evening meal.
- Example:
 - Bedtime dose is 40 units
 - Reduce by 10% = 36 units
 - 2/3 before breakfast = 24 units
 - 1/3 before evening meal = 12 units
- This is cautious dosing, so expect to increase both doses significantly.

Adjusting the insulin doses

- **Evening dose:** adjust according to fasting blood glucose.
 - Aim for fasting glucose 4.0 – 6.0 mmol/L (except if at risk from hypoglycaemia).
 - More cautious target in frail or elderly patients, e.g. <8 mmol/L or <10 mmol/L.
 - Do not increase evening dose if pre-bed or overnight hypos occur.
- **Morning dose:** adjust according to blood glucose before evening meal.
 - Aim for pre-evening meal glucose of 5.0 – 7.0 mmol/L (except if at risk from hypos).
 - More cautious target in frail or elderly patients, e.g. <8 mmol/L or <10 mmol/L.
 - Do not increase morning dose if pre-lunch or pre-evening meal hypos occur (unless hypos are infrequent and patient can recognise and treat them).
- Dose can be increased every three days, based on **average** of last three readings:
 - Increase by 2 units if above target but below 10 mmol/L.
 - Increase by 4 units if above 10 mmol/L.
 - If dose already above 20 units, increments can be 10% and 20% of current dose.