Insulin Prescribing Guidance

Type 2 diabetes
This Document aims to provide prescribing guidance to primary care practitioners on NHS Fife preferred insulin selection.

NHS Fife Diabetes MCN Prescribing Subgroup
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Introduction

This document was produced to provide a guide for primary care practitioners in cost effective and safe prescribing of insulin therapy in Type 2 Diabetes. This Guidance is not prescriptive or exhaustive and should be used in conjunction with clinical assessment and decision making.

This document was developed through consultation with key stakeholders to provide quality improvement namely safe, effective, and efficient and person centred. It is intended to be a living document and will continue to evolve as NHS Fife develops its services in response to new initiatives, changes in prescribing availability and research and through lessons learnt from its implementation.

The purpose of this document is to ensure:

- Cost effective selection of insulin therapies for initiation in Type 2 Diabetes.
- Safe and effective insulin initiation through appropriate insulin regimen initiation and adjusting.
- Support primary care practitioners’ confidence and management of insulin therapy in Type 2 Diabetes.
Important Notes to Health Care Practitioner Initiating and Managing Patients on Insulin

- Please refer to the NHS Fife Diabetes MCN (2012) Insulin Strategy for guidance on patient selection for insulin initiation (see page 5-Type 2 Initiation).
- Primary Care Practitioners initiating and/or managing patients on insulin should have relevant training and/or experience in insulin initiation and management of insulin.
- Primary Care Practitioners should seek advice or refer patients to the Community Diabetes Specialist Nurse when they have reached their level of confidence and competence.
- All patients should be referred to the dietitian when initiated onto insulin and if changing insulin regimen.
- First line insulin selection should be initiated within the chosen insulin regimen unless it is not clinically indicated (see Figure 1, page 6).
- Insulin names are in order of cost with the most cost effective listed first. However insulin device may impact on a practitioner’s prescribing choice.
- Insulin manufacturers may change insulins and/or devices periodically. Current availability should be checked prior to prescribing. Latest versions can be downloaded:
- Metformin should be continued unless not tolerated or contraindicated. Sulphonylureas should be continued with basal insulin but should be discontinued with other multiple insulin dose regimens.
- Other Oral Hypoglycaemic Agents (OHAs) or GLP-1 should be discontinued when insulin initiated unless clinical efficacy is demonstrated by recent glycaemic improvement. The licensing of other agents with insulin is continually evolving and should be checked prior to re-introduction. Re-introduction or initiation of other OHA’s or GLP-1 therapies with insulin should be referred to the Community Diabetes Specialist Nurse for consideration if practitioners feel this is out with their confidence and/or competence.
- Figures 2-5 provides guidance on insulin initiation and dose titration. However if a patient experiences an episode of hypoglycaemia that cannot be explained or their blood glucose control is below their target range the insulin impacting on that time of the day should be reduced by 2 units or 10%.
Type 2 – Initiation (adapted from NHS Fife Diabetes MCN Insulin Strategy 2012)

**Diagnosis of Type 2 Diabetes as per NHS Fife Primary Care Protocol**

**Decision to initiate insulin treatment**

Decision should be made on the following factors:
- Patient on maximum tolerated dose oral or other diabetes therapies and raised HbA1c above individualised patient target consistently over a prolonged period e.g. six months or more
- High HbA1c over three months
- Symptoms of hyperglycaemia
- Lifestyle factors

**Choice of regimen**

Initiation based on patient assessment which considers:
- Patient understanding
- Lifestyle
- Vision
- Manual Dexterity
- Education
- Choice of regimen
- Dose Titration
- Patient’s ability to perform blood glucose monitoring
- Patient support mechanisms

A dietetic review close to or at the initiation of insulin is required

**Initiation of insulin**

Review should be undertaken depending on clinical need, in consultation with nurse and dietitian.
- First medical review should be undertaken within 12 weeks of initiation.
- Second medical review should be undertaken within a minimum of 6 months – or on a needs basis

Structured review should include an assessment of:
- Clinical and lifestyle factors
- Symptoms - acute complications such as hypoglycaemia, chronic complications, inter current illness’s, absence from work where applicable
- Injection sites
- Insulin regimen – suitability and appropriateness
- Glucose monitoring and HbA1c
- Advice on access to other services
- Unmet educational need general wellbeing and emotional and psychological needs
- Agreed dietary modifications
- Patients should be encouraged to self manage, with support, and provision of the knowledge and skills to be an active partner in their care.

As per NHS Fife Primary Care Protocol
**Figure 1: Insulin Regimen Selection for Type 2 Diabetes**

- **Pre-mixed Insulin**
  - Consider pre-mixed insulin to target fasting and post-prandial hyperglycaemia when insulin intensification is required to meet a patient’s individual glycaemic target and the advantage of fewer injections is desirable.
  - NB: Patient must have a regular meal pattern.

- **Basal Bolus**
  - Consider a basal bolus regimen to target fasting and post-prandial hyperglycaemia when insulin intensification is required to meet a patient’s individual glycaemic target and the advantage of flexible meal patterns and flexible dose adjusting desirable. Patients should be able to self-administer.

- **Once Daily**
  - Consider once daily insulin in additional to OHA to target fasting hyperglycaemia or when individual glycaemic target not met.

**1st Line: NPH Intermediate acting Insulin before bed (e.g. Insuman Basal; Humulin I; Insulatard)**
1. Patient has good hypoglycaemia awareness and can interpret HBG results
2. Patient can respond to hypoglycaemia and manage appropriately.
   - NB: NPH Insulin can be given in the morning or twice daily to target rises in HBG levels

**2nd line: Basal Analogue Insulins (e.g. Insulin Glargine/Lantus; Insulin Detemir/Levemir)**
1. Patients requiring insulin to be administered by community nursing team or timing of insulin administration a consideration
2. Patient is elderly or with reduced hypoglycaemia awareness
3. Patient is unable to HBG monitor, interpret HBG results and hypoglycaemia symptoms and respond with appropriate hypoglycaemia management.

**1st Line: Pre-mixed Human Insulin (e.g. Insuman Comb 15; Insuman Comb 25; Insuman Comb 50; Humulin M3)**
Patient must have a regular meal pattern and be able to plan their meals in advance to incorporate insulin which should be administered 20-45 minutes prior to meals.

- NB: Premixed insulin administered by community nursing staff should be Insuman comb 25 vials

**2nd Line: Pre-mixed Analogue Insulin (e.g. Novomix 30; Humalog Mix 25; Humalog Mix 50)**
Some patients would benefit from a shorter duration of prandial action and the flexibility a pre-mixed analogue insulin can offer. These insulins can be taken immediately, during or following a meal.

**1st line: NPH Intermediate acting Insulin before bed (e.g. Insuman Basal; Humulin I; Insulatard)**
Patient should have good hypoglycaemia awareness.

**1st line: Soluble Human Insulin (e.g. Insuman Rapid; Humulin S; Actrapid)**
Patient should have a regular meal pattern and be able to plan their meals in advance to incorporate insulin which should be administered 15 – 45 minutes prior to a meal.

**2nd line: Basal analogue Insulin Once daily (e.g. Insulin Glargine (Lantus); Insulin Detemir (Levemir))**
If patient has reduced hypoglycaemia awareness or the prolonged duration of action desirable. This should be administered once or twice daily at approximately the same time each day.

**2nd line: Rapid Acting Analogue Insulin – One to multiple injections each day with meals (e.g. Humalog; Novorapid; Apidra)**
If patients would benefit from a shorter duration of prandial action or its rapid acting profile desirable for flexibility to be taken immediately before, during or following the meal.
**Starting Dose:** Initiate 8-10 units once daily or 0.2 units/kg

- Intermediate acting NPH insulin should be given at night or Long Acting Basal analogue given morning or night to target fasting blood glucose levels.
- Continue oral hypoglycaemic agents: Metformin and Sulphonylureas.
- Discontinue other oral hypoglycaemic agents and/or GLP-1 therapy (unless proven efficacy with recent glycaemic reduction)

**Insulin Adjustment:** Monitor fasting blood glucose (FBG) daily (and at additional times as appropriate)

- Increase insulin dose by 2 units every 3 days or
- If FBG > 10 mmols Increase insulin by 4 units every 3 days or
- If patient on > 40 units insulin daily, increase insulin by 4 units or 10% every 3 days
- Continue titrating until FBG within target 4-7 mmols or within individual target range
- If hypoglycaemia occurs consider reducing the insulin by 2 units or 10%

**Repeat HBA1c** every 3 months until individual target achieved (see Appendix 1)

If FBG within target range but HBA1c > target range:
- Monitor blood glucose readings before breakfast, lunch, evening meal and supper.
- Consider changing insulin regimen
- Consider adding in additional OHAs or GLP-1 therapy to target insulin resistance.
- Consider referral to Community Diabetes Specialist Nurse and/or dietitian

**Insulin Regimen Change (see Appendix 1):**

- Consider changing to a pre-mixed insulin regimen twice daily to target prandial rises in blood glucose levels (see figure 3 for titration advice. Starting dose would be current total daily insulin dose divided by 2 minus 10%)
- Consider adding in meal time short acting insulin to target specific meals once/twice/three times daily (see figure 5 for titration advice. Starting dose of 4 units with meal).
Starting Dose: Initiate 6-10 units or 0.1 units/kg twice daily
(Or see change of insulin regimen dose advice Figure 2)

- Premixed human insulin should be taken 20-45 minutes prior to
  breakfast and evening meal
- Premixed analogue insulin should be taken immediately before,
  during or after breakfast and evening meal.
- Continue Metformin and discontinue other OHA and/or GLP-1
  therapy
- Monitor BG 2-4xday prior to breakfast, lunch, evening meal and
  supper/bed.

Breakfast insulin
Increase by 2 units or 10% every three days
until BG before lunch and evening meal is
within 4-7 mmols or individual target

Evening meal insulin
Increase by 2 units or 10% every three days
until BG before supper/bed and FBG is within
4-7 mmols or individual target

Repeat HBA1c every 3 months until individual target achieved (see Appendix 1)

If HBA1c remains above target:
- Continue to titrate insulin until BG within target 4-7 mmols or individual target. If hypoglycaemia
  occurs consider reducing the insulin controlling that time of the day by 2 units or 10%
- Consider change in insulin regimen
- Consider adding in additional OHA and GLP-1 therapy to target insulin resistance
- Consider refer to Community Diabetes Specialist Nurse and/or dietitian

Insulin Regimen Change: Consider changing insulin regimen to three times daily mix or basal bolus as follows (see Appendix 1):

- If twice daily mixed insulin does not permit target of both corresponding pre-meal BG readings to 4-7 mmols or individual target consider switching to a three times daily mix. Reduce current twice daily doses of insulin by 10% and introduce 6 units fixed mix insulin with lunch. A switch to a 50:50 mix can be advantageous.
- If twice daily mixed insulin does not permit target of both corresponding pre-meal BG readings to 4-7 mmols or individual target or the patient finds the regimen too restrictive consider switching to basal bolus insulin regimen. Take the total insulin dose and minus 10%. Divide the total dose 50% of it basal and the other 50% divided into the three bolus doses.
**Breakfast Insulin**

Increase by 2 units or 10% every 3 days until BG before lunch within 4-7mmols or individual target.

**Lunch Insulin**

Increase by 2 units or 10% every 3 days until BG before evening meal within 4-7mmols or individual target.

**Evening meal Insulin**

Increase by 2 units or 10% every 3 days until BG before supper/bed and breakfast within 4-7mmols or individual target.

**Repeat HBA1c** every 3 months until individual target achieved (see Appendix 1)

If HBA1c remains above target:

- Continue to titrate insulin until BG within target 4-7mmols or individual target. If hypoglycaemia occurs consider reducing the insulin controlling that time of the day by 2 units or 10%.
- Consider change in insulin regimen.
- Consider adding in additional OHAs or GLP-1 therapy to target insulin resistance.
- Consider referral to Community Diabetes Specialist Nurse and/or dietitian.

**Insulin Regimen Change (see Appendix 1):**

- If using a 50:50 fixed mix and unable to target both pre-bed/supper BG and FBG to target consider switching evening meal mix to a 30:70 or 25:75 mix.
- If a mixed insulin does not permit a target of corresponding pre-meal BG readings of 4-7mmols, individual target or the patient finds the regimen too restrictive then consider switching to basal bolus insulin regimen. Take the total insulin dose and minus 10%. Divide the total dose 50% of it basal and the other 50% divided into the three bolus doses.
Title: Flowchart Insulin Regimen Selection

Starting Dose: Initiate 8-10 units or 0.2 units/kg basal insulin
Initiate 4 units bolus insulin with meals (or see change of insulin regimen dose advice Figure 3 and 4)

- Basal Intermediate acting NPH insulin should be given at night or basal long acting analogue given morning or night to target Fasting Blood Glucose (FBG) Levels.
- Human soluble insulin should be given 20-30 minutes prior to meal/rapid acting insulin should be given immediately before, during or up to 15 minutes after the meal.
- Discontinue all oral hypoglycaemic agents and/or GLP-1 therapies except Metformin
- Monitor blood glucose at least 4 times a day prior to breakfast, lunch, evening meal and supper/bed.

Basal Insulin
- Increase insulin dose by 2 units every 3 days or
- Increase insulin by 4 units every 3 days if FBG >10 mmols or if patient on >40 units basal insulin
- Continue titrating until FBG within target 4-7 mmols or within individual target range

Breakfast Bolus Insulin
- Increase insulin dose by 2 units every 3 days or
- Increase insulin by 4 units or 10% if patient on >40 units.
- Continue titrating until pre-lunch BG within target 4-7 mmols or within individual target range

Lunch Bolus Insulin
- Increase insulin dose by 2 units every 3 days or
- Increase insulin by 4 units or 10% if patient on >40 units.
- Continue titrating until pre-evening meal BG within target 4-7 mmols or within individual target range

Evening-meat Bolus Insulin
- Increase insulin dose by 2 units every 3 days or
- Increase insulin by 4 units or 10% if patient on >40 units.
- Continue titrating until pre-supper/bed BG within target 5-8 mmols or within individual target range

Ongoing Care (See Appendix 1)
- Continue to titrate insulin and repeat HBA1c every 3 months until patient reached individual BG and HBA1c target
- If hypoglycaemia occurs consider reducing the insulin controlling that time of the day by 2 units or 10%
- If patient failing to achieve individual targets consider adding in additional OHAs (GLP-1 therapy) to target insulin resistant.
- If patient failing to achieve individual targets consider referral to the Community Diabetes Specialist Nurse and/or dietitian
References

Diabetes uk (2011) Diabetes Updates Wallcharts
http://www.diabetes.org.uk/Professionals/Publications-reports-and-resources/Diabetes-Update/Wallcharts--supplements/

Gale (2012) Newer Insulins in Type 2 Diabetes BMJ 345:e4611

Indian Health Service (2011) Standards of Care and Clinical Practice Recommendations: Type 2 Diabetes; Type 2 Diabetes and Insulin Algorithm.


Texas Diabetes Council (2010) Insulin Algorithm for Type 2 Diabetes Mellitus in Adults and Children
www.tdctoolkit.org/algorithms_and_guidelines.asp
Appendix 1: Intensification of Insulin Therapy
(adapted from NHS Fife Diabetes MCN Insulin Strategy 2012)

<table>
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<th>Stage</th>
<th>Criteria</th>
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| Review and current management | For target HbA1c  
- Target HbA1c not achieved  
- Target HbA1c but disabling hypoglycaemia  
- Lifestyle  
Patient agreement to intensify their insulin management to achieve target. |
| Discuss options for change | Review current factors to determine the most appropriate way that treatment management can be intensified. This review should incorporate as a minimum the following:  
- Informed decision making  
- Patient's priorities  
- Lifestyle factors  
- Injection technique  
- Blood glucose profile  
- Symptoms of acute complications such as hypoglycaemia, chronic complications, inter current illness's, absence from work where applicable  
- Current oral or insulin therapy and regimen  
- Psychological issues  
- Dietetic assessment/review and further intervention as required |
| Implement change | Type 1; consider multiple injections. Pump therapy will only be considered after trial of Basal Bolus and Carbohydrate Counting.  
Type 2; consider intensive insulin regimen with or without oral therapy. |
| Review Objectives achieved? | NO  
YES |

Implement further treatment changes where and as appropriate.