Te Whatu Ora
Health New Zealand

HEALTH HAWKE'S BAY
Te Oranga o Te Matau-a-Māui

Best Practice Message

May 2023

Insulin Initiation for Diabetes Management

Practice changing moments:

- Patients who are unable to reach their glycaemic target with oral/GLP-1 therapy require insulin therapy.
- Early attainment of glycaemic targets provides long term prevention of microvascular and macrovascular complications of diabetes.
- Patients who have an HbA1c of ≥90mmol/mol at any stage (including diagnosis) should be initiated on insulin.

Introduction

Type 2 diabetes is a progressive disease whereby early attainment of an appropriate HbA1c targets can have long term benefits in both microvascular and macrovascular complications of diabetes such as diabetic retinopathy.[1,2] The risk of developing microvascular complications also increases exponentially with increasing HbA1c highlighting the importance of achieving HbA1c targets, especially in recent diagnosis and younger patients. Most patients would benefit from an individualized target of 48-55mmol/mol. With increasing age and co-morbidities this is often relaxed up to a target of <69mmol/mol. There are approximately 20% of patients with type 2 diabetes in Hawke's Bay with an HbA1c >80mmol/mol (this is worse in Māori with ~27% of patients with an HbA1c >80mmol/L) which highlights a need for intensifying treatment and possibly initiating insulin if oral agents and GLP-1 agonists have failed to reach an appropriate target.

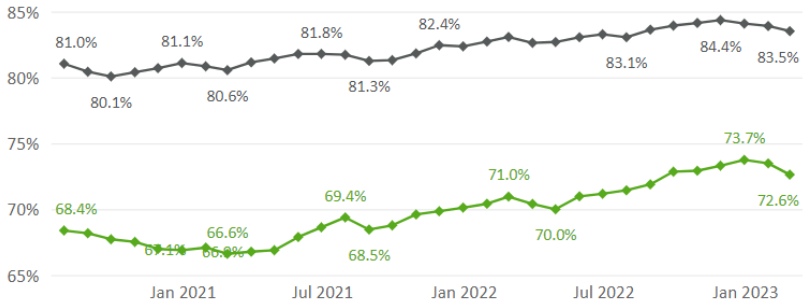

Figure 1. percentage of patients (18-74yrs) with diabetes and a recorded HbA1c ≤80mmol/mol for Māori (green) and non-Māori (grey). Practice specific data including patient lists is available via Thalamus

Initiating insulin

Due to the progressive nature of type 2 diabetes, the need for insulin should be regularly discussed with patients, emphasising its role in maintaining glycaemic control once the progression has limited the effects of their other agents. Practicalities of insulin initiation and up titration will not be covered in this message as the NZSSD has covered this in their type 2 diabetes management algorithm which can be found here. Dr Ryan Paul is also running an advanced diabetes course for free through the University of Waikato which begins on the 17th of July. Registrations can be made here.

Glucose levels can be used to determine the choice of insulin. If the patient has significant fasting hyperglycaemia or hypoglycaemia late in the day isophane insulin (Protaphane® or Humulin NPH®) may be preferable. If a patient is at a high risk for hypoglycaemia glargine insulin (Lantus®) may be preferable. It is recommended to initiate basal insulin as a night time administration due to its role in limiting hepatic gluconeogenesis overnight[3,4]

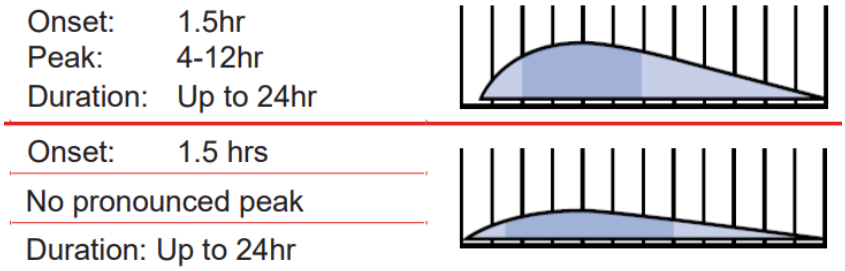

Figure 2. release profiles of isophane insulin (top) vs glargine insulin (bottom)

When using basal insulin alone, titration of insulin (and lifestyle advice and other glucose lowering agents) is guided by patient monitoring of blood glucose levels. Titration of basal insulin can be self-managed by the patient, with education and support from the clinician. Recommended titration method, if the patient has 3 consecutive fasting glucose levels >7mmol/L increase dose by 10% or 2 units. This can continue until patient reports any hypoglycaemia, fasting glucose levels <7mmol/L, or the patient has reached a dose of 0.5units/kg per day.

When basal insulin isn't enough

While basal insulin alone is the most convenient insulin regimen for a patient with type 2 diabetes, this is not sufficient for all patients. It is expected that only 30% of patients will be able to meet an acceptable HbA1c using basal insulin alone, and if they have not managed to achieve this within 1 year of insulin therapy this is much less likely[5]. If a patient cannot meet their glycaemic (HbA1c) target with a dose of basal insulin <0.5units/kg, or they are on a stable dose of basal insulin with fasting blood glucose levels, this is an indicator that prandial insulin is required, using either bolus insulin or changing to a pre-mixed insulin. NZSSD has covered the initiation of prandial insulin in their type 2 diabetes management algorithm. The choice of a cut-off of 0.5units/kg comes from the identified ceiling effect of basal insulin whereby increasing basal insulin results in diminishing returns when it comes to HbA1c reductions[6]. This is commonly considered to be 0.5units/kg however there is considerable variation. Most patients will have an individual ceiling effect with doses between 0.3-1unit/kg[5]. It is important to note however, the ceiling effect is primarily on HbA1c response and weight gain from insulin will continue to rise with higher doses.[7]

Table 1. Indicators which may suggest that patient is experiencing overbasalisation.[5]

Signs of possible overbasalisation
• Basal insulin dose >0.5units/kg • Post meal BGL >10mmol/L • HbA1c is above target despite attaining target fasting BGL. • Greater than 3mmol/L difference between bedtime and pre-breakfast BGL

Tools and further reading:

- NZSSD Type 2 Diabetes management algorithm
- Thalamus for individual report on patients with HbA1c ≤80mmol/mol
- Health Navigator – Starting insulin for people with type 2 diabetes
- Advanced Diabetes Management course through NZSSD and University of Waikato

References:

1. Persistent Effects of Intensive Glycemic Control on Retinopathy in Type 2 Diabetes in the Action to Control Cardiovascular Risk in Diabetes (ACCORD) Follow-On Study. Diabetes Care. 2016 Jul;39(7):1089–100.

2. Kim KJ, Choi J, Bae JH, Kim KJ, Yoo HJ, Seo JA, et al. Time to Reach Target Glycosylated Hemoglobin Is Associated with Long-Term Durable Glycemic Control and Risk of Diabetic Complications in Patients with Newly Diagnosed Type 2 Diabetes Mellitus: A 6-Year Observational Study. Diabetes Metab J. 2021 May;45(3):368–78.

3. American Diabetes Association. Standards of medical care in diabetes - 2021. The Journal of clinical and applied research and education. 44:s1–232.

4. Hatting M, Tavares CDJ, Sharabi K, Rines AK, Puigserver P. Insulin regulation of gluconeogenesis. Ann N Y Acad Sci. 2018 Jan;1411(1):21–35.

5. Cowart K. Overbasalization: Addressing Hesitancy in Treatment Intensification Beyond Basal Insulin. Clin Diabetes. 2020 Jul;38(3):304–10.

6. Zisman A, Morales F, Stewart J, Stuhr A, Vlajnic A, Zhou R. BeAM value: an indicator of the need to initiate and intensify prandial therapy in patients with type 2 diabetes mellitus receiving basal insulin. BMJ Open Diabetes Res Care. 2016 Apr 13;4(1):e000171.

7. Umpierrez GE, Skolnik N, Dex T, Traylor L, Chao J, Shaefer C. When basal insulin is not enough: A dose–response relationship between insulin glargine 100 units/mL and glycaemic control. Diabetes Obes Metab. 2019 Jun;21(6):1305–10.

Authored by: Ben Firestone

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