

# Insulin Optimisation Workshop

Theingi Aung & Claire Rowell

# Insulin initiation and titration

- structured education
- continuing telephone support
- frequent self-monitoring
- dose titration to target
- dietary understanding
- management of hypoglycaemia
- management of acute changes in plasma glucose control
- support from an appropriately trained and experienced healthcare professional.

# Insulin Preparations

- **Rapid-acting insulin analogues:** onset of action of approximately 15 minutes and a duration of action of 2–5 hours
- **Short-acting insulins:** onset of action of 30–60 minutes and a duration of action of up to 8 hours
- **Intermediate-acting insulins:** these have an onset of action of approximately 1–2 hours, maximal effects between 4 and 12 hours and a duration of action of 16–35 hours
- **Long-acting insulin analogues:** these can last for a longer period than intermediate-acting insulins; they are normally used once a day and achieve a steady-state level after 2–4 days to produce a constant level of insulin.
- **A biphasic insulin** is a mixture of rapid-acting insulin analogue or short-acting insulin together with intermediate-acting insulin.

# Insulin initiation Type 2 DM

- Begin with human NPH insulin injected at bed-time or twice daily according to need.
- Consider, as an alternative, using a long-acting insulin analogue (insulin detemir, insulin glargine) if:
  - the person needs assistance from a carer or healthcare professional to inject insulin, and use of a long-acting insulin analogue (insulin detemir, 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, or
  - the person cannot use the device to inject NPH insulin.

# Oral agent combination therapy with insulin in Type 2 DM

When starting basal insulin therapy:

- continue with metformin and the sulfonylurea (and acarbose, if used)
- review the use of the sulfonylurea if hypoglycaemia occurs.

When starting pre-mixed insulin therapy (or mealtime plus basal insulin regimens):

- continue with metformin
- continue the sulfonylurea initially, but review and discontinue if hypoglycaemia occurs.

# Insulin initiation Type 1 DM

- **One, two or three insulin injections per day:** these are usually injections of short-acting insulin or rapid-acting insulin analogue mixed with intermediate-acting insulin.
- **Multiple daily injection regimen:** the person has injections of short-acting insulin or rapid-acting insulin analogue before meals, together with one or more separate daily injections of intermediate-acting insulin or long-acting insulin analogue.
- **Continuous subcutaneous insulin infusion** (insulin pump therapy):

# Self-monitoring of plasma glucose

Assess at least annually and in a structured way:

- self-monitoring skills
- the quality and appropriate frequency of testing
- the use made of the results obtained
- the impact on quality of life
- the continued benefit

# Basics.....before changing insulin

- Diet
- Exercise
- Glucose monitoring-Glucometer
- Self monitoring skills
- Insulin injection site
- Injection technique
- Reason for recent high readings.....infection, steroids

# Insulin skills case reviews

These represent typical clinical scenarios for people with diabetes treated with insulin. Please review the history and results of these cases, and decide how glycaemic control might be improved or complications of treatment be reduced. What kinds of treatment changes are most appropriate for these patients? If changes in insulin treatment are planned, discuss how doses are to be titrated. Treatment plans should review diet, exercise, and injection technique.

## Case 1

A 55-year-old woman with type 2 diabetes, obesity, and hypertension has been under your care for the past 7 years. She has microalbuminuria, background retinopathy, and neuropathy. She has never had a cardiovascular event and reports no cardiac symptoms.

In the past, she has successfully lost weight (from 5 to 12 kg) on various diets but each time has regained all of the weight she lost and now. She tries to walk 30 minutes each day. She has been receiving metformin (1000 mg twice a day) and gliclazide (160 mg twice daily), and Glargine 20 units nocte

She has hypertension that is treated with hydrochlorothiazide (25 mg daily) and lisinopril (20 mg daily). She takes aspirin and simvastatin (20 mg daily). She notes that she consistently takes her medications. She has a family history of cardiovascular disease with early stroke. On physical examination, BMI is 31. Her blood pressure is 128/78 mm Hg. Her glycated haemoglobin level is 95, and her creatinine 80 mmol per litre. She has no microalbuminuria, and liver-function studies are normal.

	Fasting am	2 hr post Breakfast	Before Lunch	2 hr post Lunch	Before Evening Meal	2 hr post Evening Meal	Bedtime	3am
1	10				14			
2	13						12	
3	9				16			
4	6				11			
5								
6				17				
7						18		
8	9				8			
9			6			12		
10	11							
11								
12	8							
13							16	
14		12			18			

# Case 1

Monitor a person on a basal insulin regimen (NPH insulin or a long-acting insulin analogue [insulin detemir, insulin glargine]) for the need for short-acting insulin before meals (or a pre-mixed insulin preparation). **[new 2009]**



### Case 3

A 43-year-old male with type 2 diabetes, no complications or cardiovascular event and reports no cardiac symptoms. Teacher, keen cyclist club cycle trips every weekend 20-30 miles, Morning fasting glucose levels have ranged between (6-10 mmol litre, but occasionally 20+). Has been receiving metformin (1000 mg twice a day) and novomix 30 26 units am 14 units pm BMI 23. glycated haemoglobin level is 73, and creatinine 98 mmol per litre, eGFR >60.

	Fasting am	2 hr post Breakfast	Before Lunch	2 hr post Lunch	Before Evening Meal	2 hr post Evening Meal	Bedtime	3am
1	6				8			
2			5				9	
3								
4								
5	3				4			
6			2		7			3
7	14							
8	7							
9			7				9	
10	6				8			
11			5				9	
12								
13								
14			5		7			3
15	17							

## Case 4

A 52-year-old male taxi driver with type 2 diabetes, obesity, and hypertension has been under your care for the past 6 years. Background retinopathy, ED and peripheral neuropathy. BMI 36. Has had MI and stent. HbA1c 120. Treatment, Metformin 1g bd and gliclazide 160 bd and liraglutide 120od and Detimir 76 units od. Creatinine 165 mmol per litre, eGFR 42.

What kind of treatment would you find most appropriate for this patient?

	Fasting am	2 hr post Breakfast	Before Lunch	2 hr post Lunch	Before Evening Meal	2 hr post Evening Meal	Bedtime	3am
1	5		5		8		6	
2	5		6	6	7		6	
3	4		5		6		7	
4	5		6		7			
5	5		5		8		6	
6	5		5		8		6	
7	5		5		8		6	





## Case 6

23 year old female with T1 DM for 12 years, has background retinopathy, recently moved in with male partner, not required assistance with hypoglycaemia, but having lots of hypos. Gives all insulin shots into upper left thigh. BMI 27, HBA1c 73. Current treatment Glargine 24 10 pm, varies dose as per carbohydrate intake.

	Fasting am	2 hr post Breakfast	Before Lunch	2 hr post Lunch	Before Evening Meal	2 hr post Evening Meal	Bedtime	3am
1	6	13	3.5	10	4		12	3
2	4	11	4		4	16		
3	7	9	5		6	9	10	
4	6	15	4		4	18		
5	4	8	5		5		12	

# Summary....

- Empowerment and patient involvement in initiation, monitoring and change treatment...
- Family and carer involvement wherever appropriate if patient agrees...
- To remember basic facts.....before changing insulin regime
- Education and continuing support for insulin titration
- Individualised care plan-MDT approach