



Insulin switch & Algorithms

Rotorua GP CME June 2011

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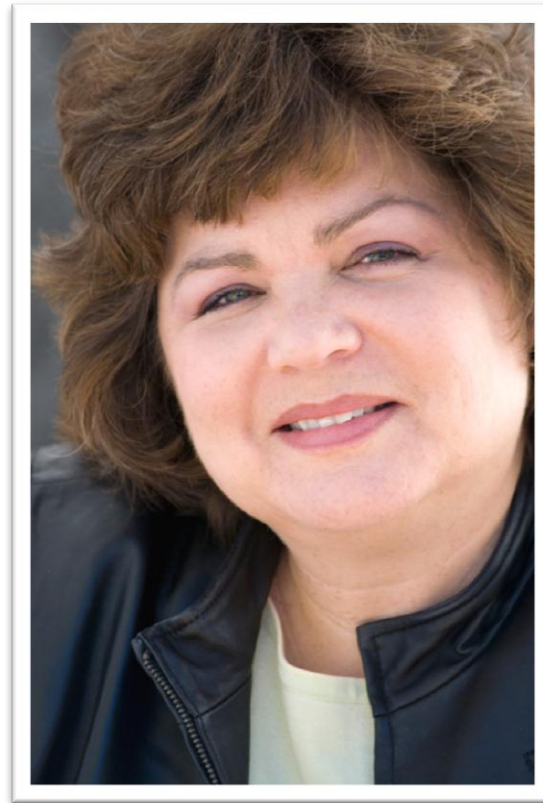
Goal of workshop

Insulin switching – make the necessary move

Ensure participants are confident with

- Recognising when insulin should be changed
 - Understanding switching algorithms
 - Use of Rapid acting Insulins

Jackie



Medical history



- 56-year-old teacher
- History of hypertension
- Diagnosed with diabetes 5 years ago
- Commenced premixed insulin 8 months ago
- Has come to see you as she is concerned about her weight: put on 9 kg since she started on insulin
- She is also having morning hypos

Medications



- Premixed insulin (30:70): 25 units twice daily
 - Increased from 12 units twice daily over past 8 months
- No oral hypoglycaemics
- Inhibace: 5 mg daily
- Hydrochlorothiazide: 12.5 mg daily
- Simvastatin: 40 mg daily

Examination/investigations



- BP: 145/90 mmHg
 - Was well controlled with ACE inhibitor until this visit
- BMI 30 kg/m² (Height 158 cm; weight 75 kg)
- Total cholesterol: 6.1 mmol/L
 - Triglycerides increased from 1.5 to 3.2 mmol/L since last measured 2 months ago
- HbA1c: 7.9%
- eGFR: 55 mL/min
- No other obvious causes of weight gain (e.g. hypothyroidism)

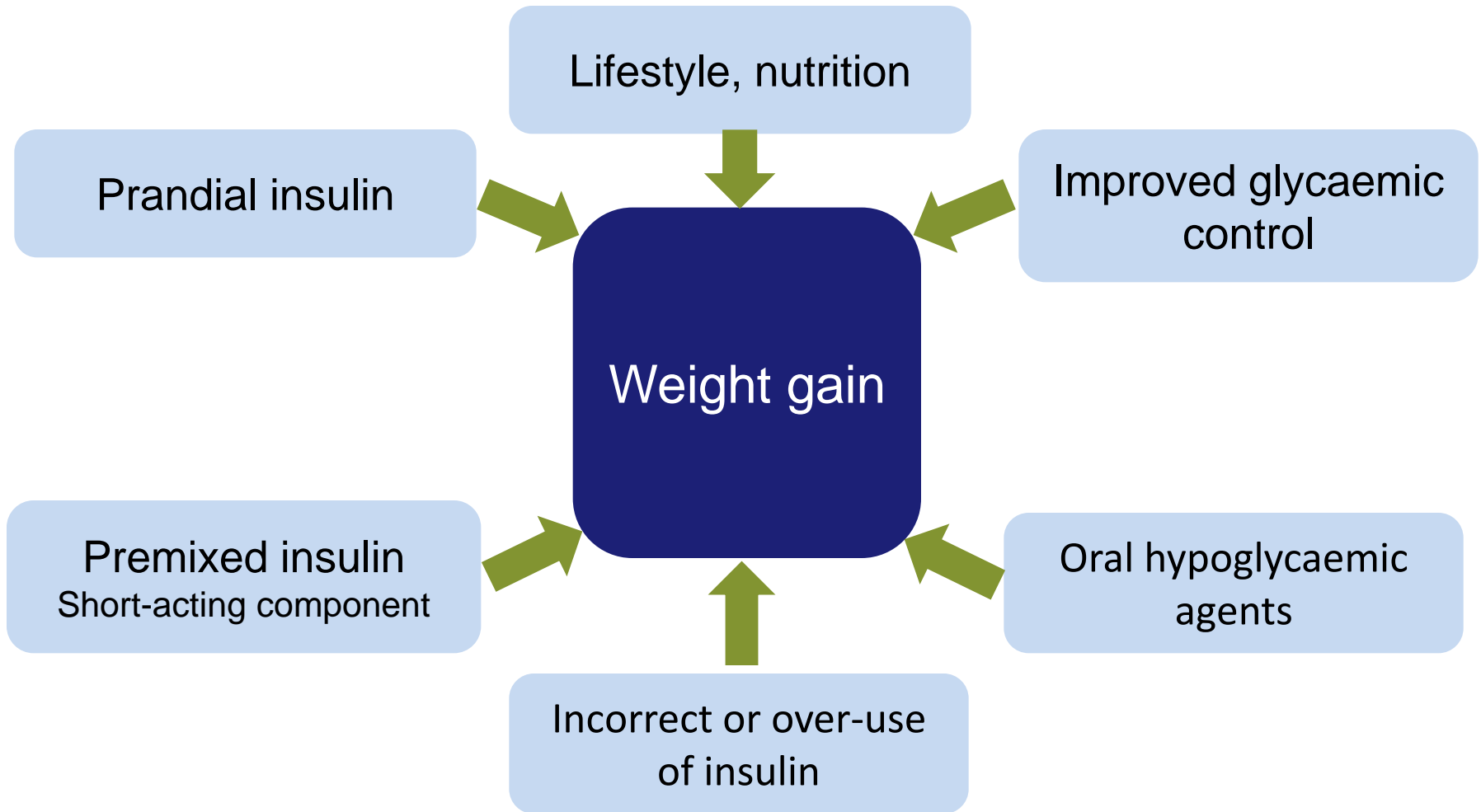


How does insulin contribute to weight gain?



**“Since my husband developed diabetes,
I’ve lost thirty pounds following his diet!”**

Weight gain in T2D





Which of these oral hypoglycaemic agents is associated with the least weight gain?

- A. Pioglitazone
- B. Glipizide
- C. DPP-4 inhibitors
- D. Metformin
- E. All about the same in terms of weight gain

How would you adjust Jackie's medication to address her weight?



- A. Introduce metformin* to the twice daily premixed insulin schedule
- B. Switch from twice daily premixed to basal/bolus
- C. Switch from twice daily premixed to twice-daily long-acting basal insulin
- D. Switch from twice daily premixed to once-daily long-acting basal insulin and re-introduce metformin*
- E. None of the above

* if not contraindicated

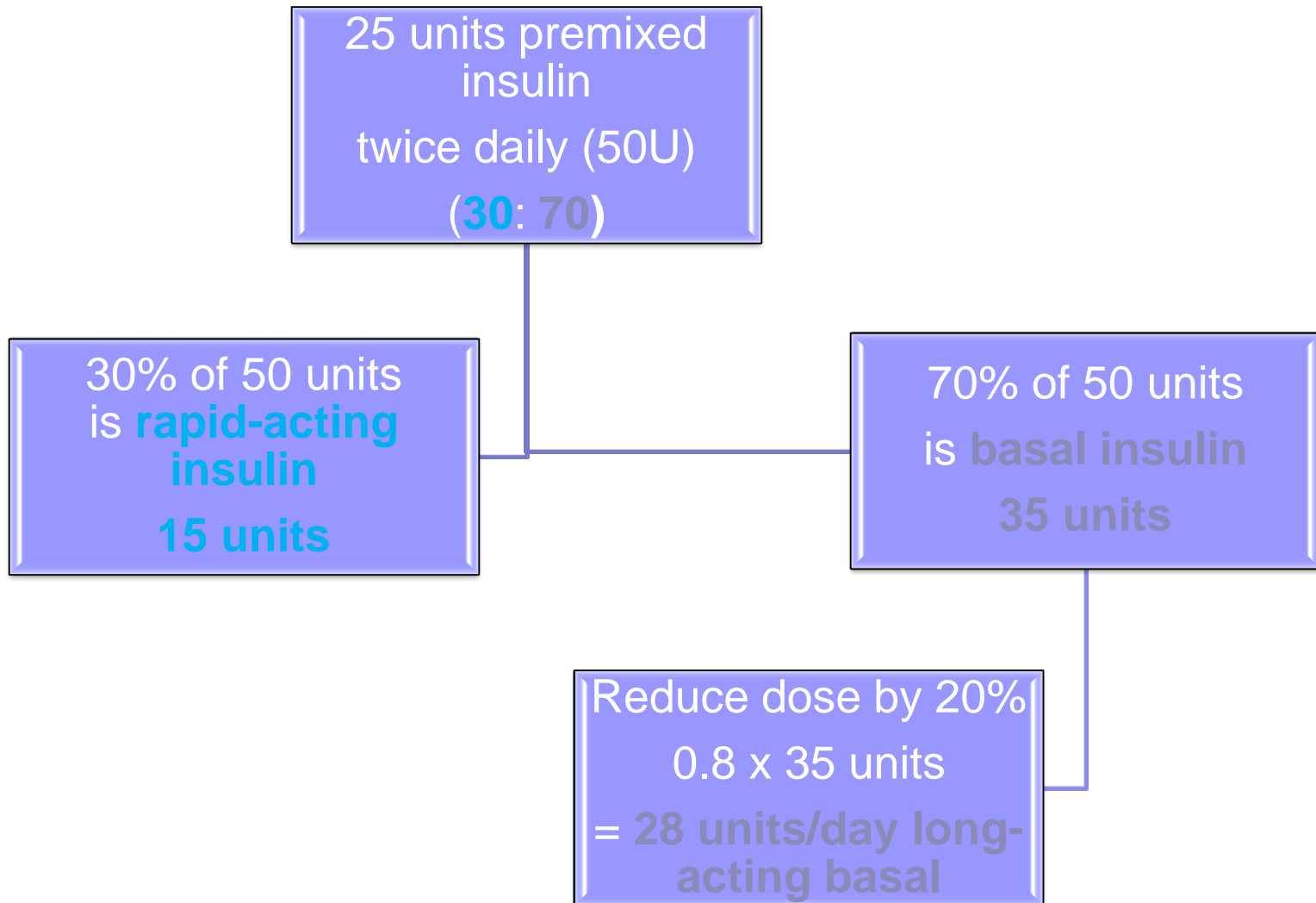
Switching insulins

- Switch from premixed insulin (30:70) BD to once-daily long-acting basal insulin (at bedtime) and introduce metformin
 - Calculate the dose of long-acting basal insulin to be given at bedtime

1. Phillips P. KISS Part 4. Medicine Today 2007; 8(6): 43-52.

Consider a further 10% dose decrease if severe hypoglycaemia has occurred in the past¹

Premixed BD to long-acting basal



Converting from premixed to long-acting basal insulin

Premixed
once daily



- Use 100% of total basal dose once daily*

Premixed
twice daily



- Use 70-80% of total basal dose once daily*

*Fix the fasting BG then review the need for prandial insulin

Managing other likely contributors to Jackie's weight gain



- Monitor her eating, activity and insulin schedules closely and amend them to compensate for decreased glycosuria
 - Encourage her to 'eat less and walk more'

- Arrange a dietician review for Jackie



What would you consider now to manage her triglyceride levels?

1. Optimise glycaemic control
2. Increase physical activity
3. Consider omega-3 fatty acid supplementation
4. Increase her statin dose
5. All of the above?

Hypertriglyceridaemia

- Priority is to optimise glycaemic control¹
- Dietary advice will help lipid profile and weight
 - Lower total fat intake¹
 - Increase intake of omega 3 fats¹ with diet or supplementation (5 mg/day)
 - Increase dietary fibre¹
 - Ask about alcohol intake
- Modify/add pharmacological agents only if required¹
 - Could increase dose of statin
 - Add fenofibrate or gemfibrozil if hypertriglyceridaemia plus hypercholesterolaemia persists (care with myopathy)



How does alcohol affect glycaemic control?

1. Can cause 'delayed' hypoglycaemia
2. Can cause hyperglycaemia
3. Causes immediate weight loss
4. Can increase weight gain
5. 1, 2 and 4 above?

Effects of alcohol

In addition to its potential to affect glycaemic control, alcohol:


- Is associated with increased HDL-cholesterol and triglycerides¹
- Can cause significant weight gain as high in calories² and may promote fat deposition^{3,4}

1. NHMRC T2D guidelines, lipid control, 2004. 2.
2. Healthy eating and diabetes. Alcohol and diabetes. The Queen Elizabeth Hospital Diabetes Centre, 2007.
3. Australian guidelines. To reduce health risks from drinking alcohol. NHMRC, 2009.
4. GrogWatch newsletter, 34th issue, October 2007. Community Alcohol Action Network, an initiative of the Australian Drug Foundation.

12 weeks later....



- Jackie returns for a follow-up appointment:
 - Glycaemic control remains reasonable (A1c 7.4%)
 - Lost 2 kg during the first 6 weeks but weight has plateaued since then




What could be behind
Jackie's weight loss
plateauing?



On questioning Jackie....

You find that she:

- Hasn't been exercising
 - Intends to but never finds the time
- Is worried about hypoglycaemia with insulin
- Has been eating more carbohydrate in the day
 - Was told by a friend on insulin to have regular carbohydrate snacks as well as her three meals
- Feels better and may have been eating more because of this



What would you suggest now?

Next steps for Jackie



- Suggest Jackie:¹
 - Adjusts hypoglycaemic medication to suit lifestyle – not vice versa
 - Increase physical activity
- As her GP, be content with an A1c of 7.4% – at least until weight is controlled¹

Jackie needs support to establish confidence in her new insulin regimen and re-learn how to adjust her dietary carbohydrate intake and insulin dosing

Remember...


Increased physical activity and weight loss will also improve Jackie's hypertension:¹

Intervention	Blood pressure reduction (mmHg)
Weight loss*	15/8
Aerobic exercise	4/3

*9 kg in 6 months.

This, in turn, will help improve the microvascular² and cardiovascular outcomes¹ of her diabetes

1. NHMRC T2D guidelines, BP control, 2004.
2. UKPDS 33. Lancet 1998; 352: 837-53.



**What are your key learnings
in managing potential
weight gain
at insulin commencement?**



Practice points

1. Rapid-acting insulin rarely needed at insulin commencement – common reason for:
 - Increased appetite
 - Weight gain
 - Hypoglycaemia

2. Don't stop metformin at insulin commencement
 - Increases insulin sensitivity



Practice points

3. Encourage 'eat less, walk more'
4. Don't adjust patient's lifestyle to match the insulin...
 - ...Adjust the hypoglycaemic treatment to match patient's lifestyle (and preferably work on optimising that)
5. Educate on alcohol

Practice points

6. Metabolic control in type 2 diabetes always addresses:

- Blood glucose
- Blood pressure
- Blood lipids

**Absolute cardiovascular risk assessment tool
from *NZ Heart Foundation, NZGG, Predict
etc***

Steve



Medical history

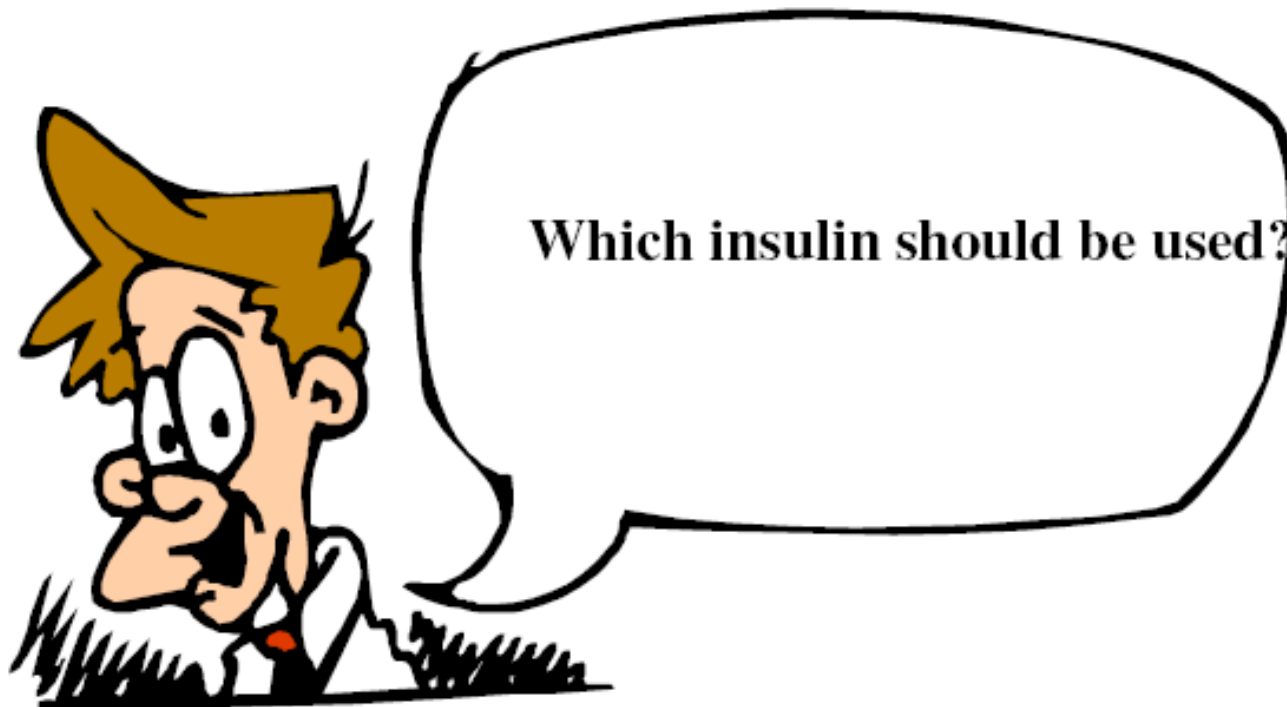


- 63-year-old engineer, lives with wife
- Diagnosed with diabetes 8 years ago
- Commenced on NPH insulin nocte 6 months ago
- Currently on 24 units nocte in addition to Metformin and Gliclazide.
- Glycaemia improved from 8.9% to 7.6% since starting him on insulin
- Eats mainly breakfast and dinner due to his work.
- Steve presents to you for review.

Steve's BG readings



	Fasting	Post-breakfast	Pre-dinner	Post-dinner
<i>Wednesday</i>	5.1	12.0	6.3	9.4
<i>Thursday</i>	4.8	7.5	5.7	10.2
<i>Friday</i>	5.9			
<i>Saturday</i>	11.4	14.8		13.2
<i>Sunday</i>	6.8	8.5	5.9	10.3
<i>Monday</i>	6.2			
<i>Tuesday</i>	7.1	9.5	4.9	8.9
<i>Wednesday</i>	6.7	10.6	7.0	10.6



Which insulin should be used?

Suitable insulin regimens

- **Twice daily Premix insulins**
 - 1/3rd of current NPH insulin dose as mane (8) and current NPH insulin dose as evening (24) Premix insulin (HumalogMix 25 or Penmix 30)
- **NPH insulin plus prandial insulin**
 - Rapid acting analogue 4-6 units with meals and aim for post-prandial BGs around 6-8
- Continue current OHAs
- If hypos, consider reducing/stopping Sulphonyl urea (Gliclazide).



Insulin Switch- NPH to Long acting analogues (Glargine or Detemir)

- From once daily NPH

1 unit of NPH= 1 unit of Long acting analogue

- From twice daily NPH

80 % of total daily (NPH) dose= Units of Long acting analogue

Insulin Switch- NPH to Twice daily preMix insulins

eg; Penmix 30/70, HumalogMix 25/75

- If already on twice daily NPH dose, initiate same dose of Premix insulin dose twice daily
- If on once a day NPH insulin, you may consider splitting the dose twice daily.
- Either 2/3rd in the morning and 1/3rd in the evening with meals

eg; Patient is on 60 units of NPH insulin, therefore you can split the dose as 40 units of premix insulin mane and 20 units of premix insulin in the evening.

Insulin Switch- Twice daily PreMix insulins to Basal –bolus regimen

- Calculate Basal Insulin dose (eg; Glargine/Detemir)

1. Determine Total daily dose of NPH

eg: Patient on Penmix 30 insulin 50 units twice daily
(NPH 35 units and Regular insulin 15 units twice daily)

Lantus/Levemir dose would be =80% of 70 Units of NPH=56 units

- Calculate bolus insulin dose (eg; Apidra, Novorapid or Humalog)

Above patient will need = total daily dose of regular insulin ÷ 3, $30/3= 10$ units

Insulin Switch-

Basal insulin to Twice daily PreMix insulins eg; Penmix 30 or HumalogMix 25

- Calculate the total daily basal insulin dose
2 options;
 - ▶ give $\frac{2}{3}$ rd in the morning with breakfast and $\frac{1}{3}$ rd with dinner meal
or
 - ▶ give $\frac{1}{2}$ with breakfast and $\frac{1}{2}$ with dinner meal

eg: Patient takes 46 units of NPH at night and 34units of NPH at breakfast

Therefore, either 40 units twice daily or 54 units mane and 26units evening of Premix insulin



Rapid acting insulins

- Novorapid/Humalog/Apidra
- All are essentially similar efficacy
- Similar action profiles
- Needs to be taken with meals

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“The healthiest part of a donut is the hole. Unfortunately, you have to eat through the rest of the donut to get there!”

Start Protaphane/Humulin N 10 units (0.2U/kg bedtime) or long acting basal insulin analogue 10 units at bedtime or mane

**Increase dose 2 units every 3-4 days until mean fasting BG < 6mmol/L
Make sure there is no rebound hyperglycaemia in the mane**

If hypo, decrease dose by 4 units or 10% of the dose if >60 units

HbA1C >7 % after 3/12

No

Continue regimen and monitor A1C 3/12ly

Yes

Fasting O.K. then check pre meals and add second injection, 6-8 units mane, adjust every 3-4 days until pre meals <6 mmol/L

A1C > 7%, check post meal blood glucoses and add rapid acting analogues 4-6 units with meals or change to Penmix/Humalogmix/Novomix twice daily, 0.2 units/kg mane and 0.1u/kg evening

Monitor A1C every 3/12



Thank you.