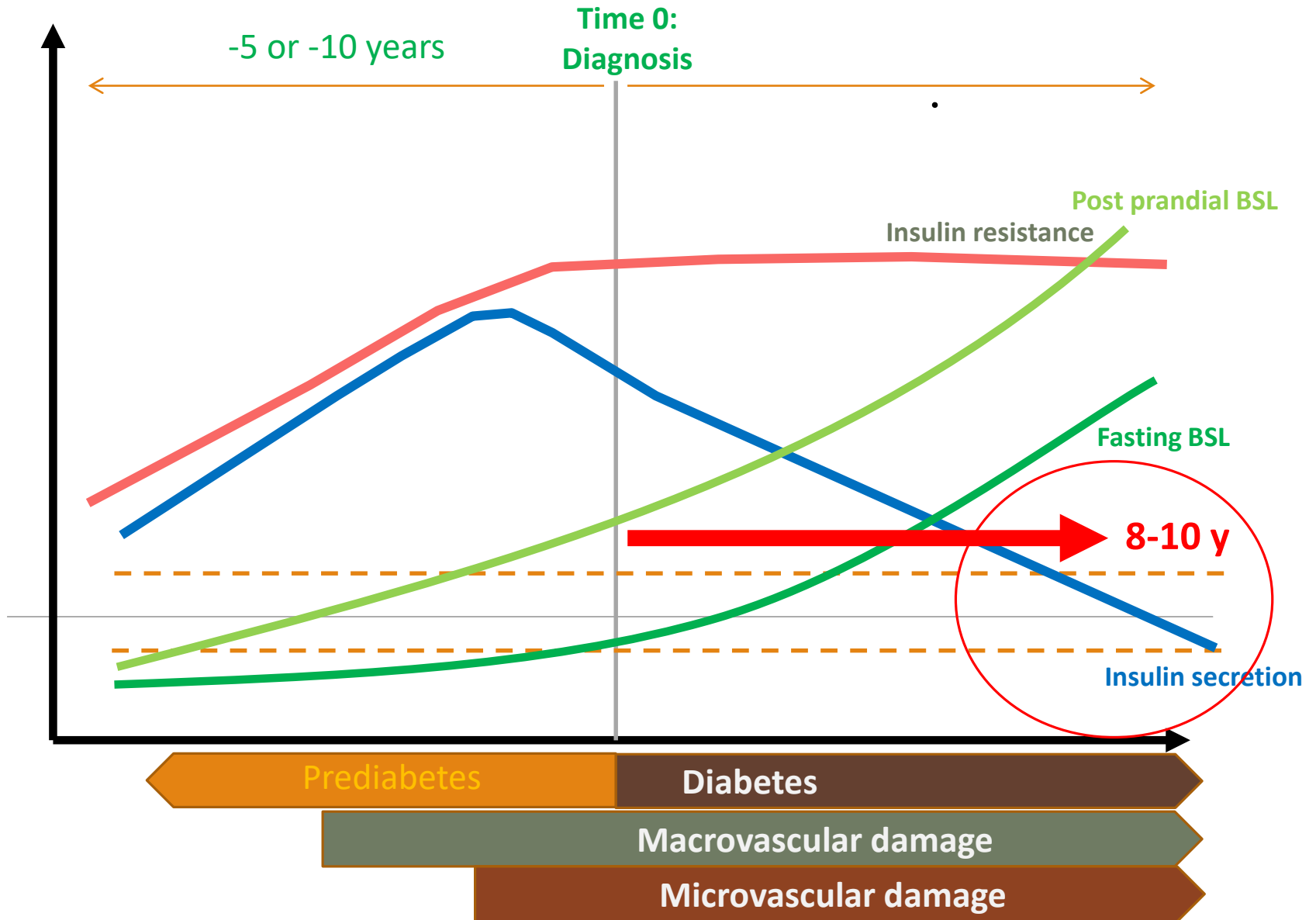


# When insulin is needed

CASE 2 - ROSE

# The progression of T2D



# When is insulin commonly necessary?



Type 1 diabetes



Secondary diabetes – e.g. post severe pancreatitis



Diabetes in pregnancy



Symptomatic or severe hyperglycaemia



Peri-operative care



Sick day including sepsis



Patients on corticosteroids

# ...and in Advanced T2D

---

WHEN THERE ARE FEW BETA CELLS LEFT

Lifestyle issues are as **important** in early as well as advanced diabetes



Diet

Carbohydrate intake



Regular exercises

Aerobic  
Resistance



Weight loss

Low calorie diet option

Bariatric surgery in appropriate patient

---

68 years old, Filipino lady

---

Lot of diabetes in the family – parents, uncle, aunties, brother

---

Enrolled nurse at nursing home – fixed day shift

---

Diagnosed T2D at least since 2003 – incidental

---

Metformin initially, then **Diamicron** added, then sitagliptin

---

Minimal exercises apart from “running around” at work

---

Diet seems to have lots of carbs – rice, sweets etc

---

Diabetes control said to be “good” according to her last GP

---

Rose

# Meds

---



Januvia

(Sitagliptin/Metformin XR)

100mg/2000mg daily



Diamicron MR 60mg one bd

# Findings

---

## **Examination:**

Weight 48.5 kg, Height 152 cm

BMI 23 kg/m<sup>2</sup>

BP 149/65, HR 65 bpm, regular

No abdominal obesity noted

Cardiac/carotids/ECG - normal

Feet/ABI – normal

Retina – see later

## **Laboratory results:**

Fasting BSL 11.6 mmol/L

HbA1c 9.1 % (76 mmol/mol)

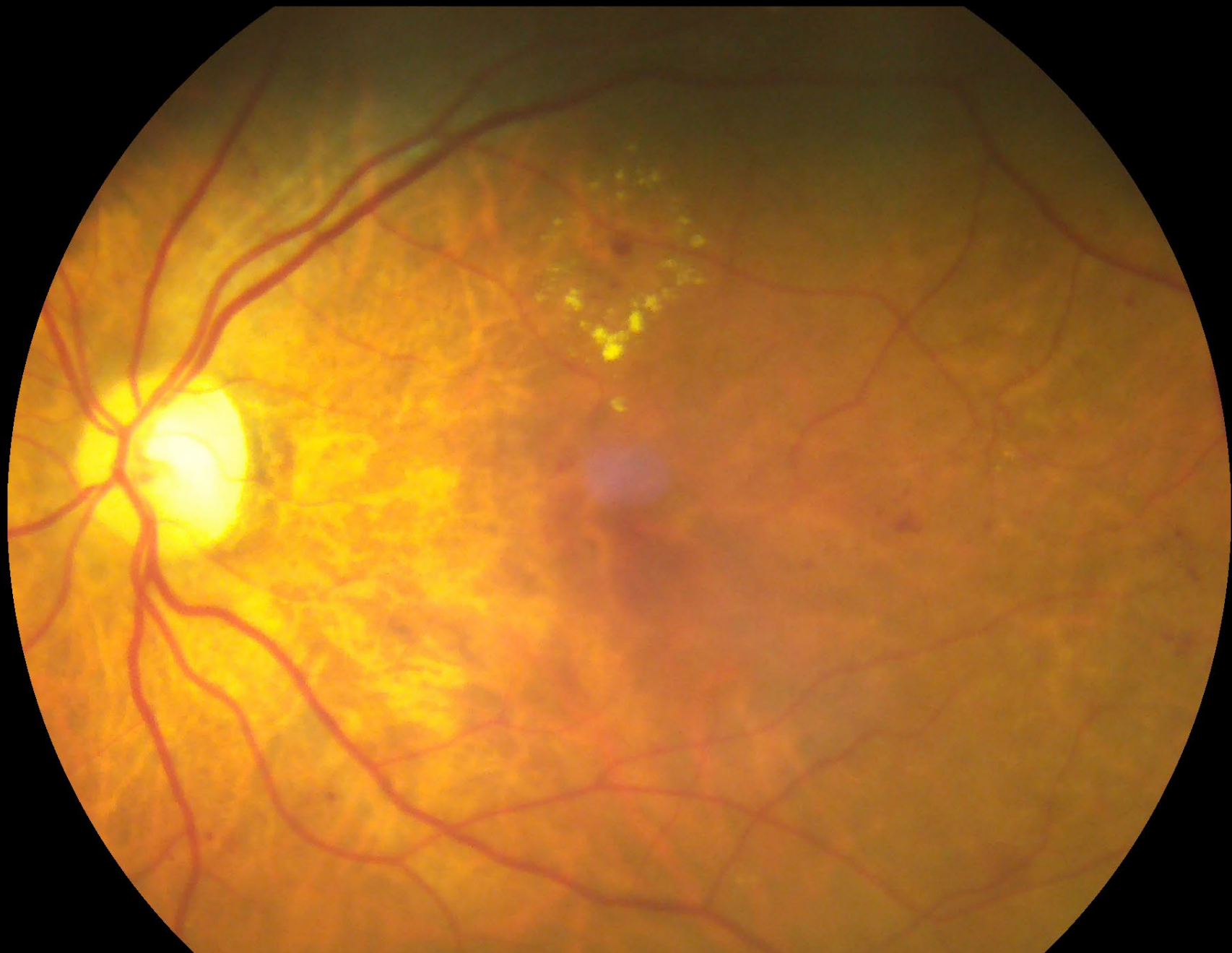
TC 4.2 TG 0.9 HDL 1.1 LDL 2.7

GGT 52, AST 52

eGFR 86 mmol/L

uACR 1.5 mg/mmol





# History of the diabetes

---

Date	A1c
28-May-17	9.1
17-Jul-17	8.7
18-Oct-17	8.0
15-Mar-18	8.7
15-Jul-18	8.8
15-June-19	9.4

# What clinical risks does Rose have?



Retinopathy



ASCVD



Heart failure



Renal Impairment



Peripheral arterial disease



Neuropathy



High risk foot

# What clinical risks does Rose have?



**Retinopathy**



**ASCVD – high risk?**



Heart failure



Renal Impairment



Peripheral arterial disease



Neuropathy



High risk foot

# Rose's clinical problems

---

GLYCAEMIC CONTROL

(HBA1C 9.1%)

---

BP CONTROL

(149/65)

---

LIPID CONTROL

(LDL 2.7 MMOL/L)

---

DIET UNKNOWN - HIGH IN CARBS?

---

RETINOPATHY

---

FATTY LIVER (MILD)

---

NOT OVERWEIGHT

INSULINOPENIC

---

NO EXERCISE

Given



Statins



ACEi or ARB



Fenofibrate (lipidil)



Eye referral

Go to [menti.com](https://www.menti.com) and Use code 56 73 82

### Question 4:

What is Rose's HbA1c target?

1. 6.0-6.5%
2. 6.5-7.0%
3. 7.0 – 8.0%
4. >8.0%
5. Doesn't matter – too late now

BEFORE WE  
ESCALATE  
THERAPY...

**STOP RULE!**



# STOP RULE!



Adherence



Motivation



Patient education



Lifestyle issues



Drug interaction



Intercurrent infection



Secondary causes – pancreatic pathology



Have we excluded T1D

Lifestyle issues are as **important** in early as well as in advanced diabetes



Diet

Carbohydrate intake



Regular exercises

Aerobic  
Resistance



Weight Mx

Low calorie diet option

Bariatric surgery in appropriate patient

# Managing weight



Dietitian referral



Low calorie diet



Very low calorie diet



Saxenda injections



Bariatric surgery

Go to [menti.com](https://www.menti.com) and Use code 56 73 82

**Question 5:**  
Rose's  
glycaemic  
control  
options

1. More diet and exercise *advice*
2. Add SGLT2 inhibitor
3. Stop DPP4 inhibitor and commence GLP1-RA
4. Commenced insulin therapy – which insulin, which device, when
5. Do nothing and see 3 months

What can  
help us  
make a  
decision?

MORE  
INFORMATION  
NEEDED

# Self monitored blood glucose

SMART  
MONITORING –  
LESS PAIN  
MORE  
BENEFITS

## Current meds: Janumet & Diamicron

<b>Before</b> HbA1c 9.1%	Self - monitored blood glucose (mmol/L)							Comments	
	Breakfast		Lunch		Dinner		Before Bed		Overnight
	Before	After	Before	After	Before	After			
Day 1	8.9	12.8	10.0	12.9	9.1	11.6	9.8		
Day 2	8.8	10.4	10.2	12.7	9.7	11.5	10.4		
Day 3	9.5	12.7	11.7	12.6	11.1	12.7	10.8		

**Comments?**

Go to [menti.com](https://www.menti.com) and Use code 56 73 82

**Question 6**  
Rose's  
Glycaemic  
control  
options now

1. More diet and exercise *advice*
2. Add SGLT2 inhibitor
3. Stop DPP4 inhibitor and commence GLP1-RA
4. Commenced insulin therapy – which insulin, which device, when
5. Do nothing and see 3 months



# Initiating injectables

BARRIERS TO  
INJECTABLE  
THERAPY

# Barriers to injectables

---

## PATIENT FACTORS

Needle phobia

Hypoglycaemia risk

Weight gain

Treatment complexity

“End of the road”

Failure

Death

## PHYSICIAN FACTORS

Hypoglycaemia worries

Weight gain

Treatment complexity

“Lack of benefit”

“Too late”

Knowledge gap

Inertia

# Decision time

Byetta 5-10  $\mu\text{g}$  bd

**Diamicron continued but Janumet changed to Metformin  
Initiated on Byetta 5µg bd  
Titrated to 10µg bd over 4 weeks**

**Initial**

<b>Before</b> HbA1c 9.1%	Self - monitored blood glucose (mmol/L)						Before Bed	Overnight	Comments
	Breakfast		Lunch		Dinner				
	Before	After	Before	After	Before	After			
Day 1	8.9	12.8	10.0	12.9	9.1	11.6	9.8		
Day 2	8.8	10.4	10.2	12.7	9.7	11.5	10.4		
Day 3	9.5	12.7	11.7	12.6	11.1	12.7	10.8		

**After 3 months**

<b>Before</b> HbA1c 8.7%	Self - monitored blood glucose (mmol/L)						Before Bed	Overnight	Comments
	Breakfast		Lunch		Dinner				
	Before	After	Before	After	Before	After			
Day 1	7.9	9.1	8.2	9.6	8.2	9.6	8.8		
Day 2	7.8	9.4	9.2	9.7	8.1	9.5	8.4		
Day 3	8.3	8.7	8.7	10.2	8.1	10.7	9.7		



# Negotiating a deal

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INSULIN THERAPY



## Which insulin

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Basal insulin

Mix insulin

Basal Plus bolus

Go to [menti.com](https://www.menti.com) and Use code 56 73 82

## Question 7:

Which  
insulin?

Basal insulin

Mix insulin (pre mix or co-  
formulation)

Basal plus bolus

## Current meds: Metformin, Diamicron, Byetta 10 µg bd

Before HbA1c 8.7%	Self - monitored blood glucose (mmol/L)						Before Bed	Overnight	Comments
	Breakfast		Lunch		Dinner				
	Before	After	Before	After	Before	After			
Day 1	7.9	9.1	8.2	9.6	8.2	9.6	8.8		
Day 2	7.8	9.4	9.2	9.7	8.1	9.5	8.4		
Day 3	8.3	8.7	8.7	10.2	8.1	10.7	9.7		

## Which insulin?

- Basal or Mix
- Which basal
- Which Mix – premix or Co-formulation
- Morning or night dose
- Daily dose or bd dose
- How much to initiate



## Insulin glargine U300 initiated 10U before bed.

<b>Before</b> HbA1c 8.7%	Self - monitored blood glucose (mmol/L)							Before Bed	Overnight	Comments
	Breakfast		Lunch		Dinner					
	Before	After	Before	After	Before	After				
Day 1	7.9	9.1	8.2	9.6	8.2	9.6	8.8			
Day 2	<b>7.8</b>	<b>9.4</b>	<b>9.2</b>	<b>9.7</b>	<b>8.1</b>	<b>9.5</b>	<b>8.4</b>			
Day 3	8.3	8.7	8.7	10.2	8.1	10.7	9.7			

### After 2 weeks...

	Self - monitored blood glucose (mmol/L)							Before Bed	Overnight	Comments
	Breakfast		Lunch		Dinner					
	Before	After	Before	After	Before	After				
Day 1	7.5									
Day 2	<b>7.9</b>									
Day 3	7.4	7.8								
Day 4	<b>8.1</b>						<b>8.0</b>			
Day 5	7.8									
Day 6							<b>8.3</b>			
Day 7	8.0						7.8			

**What's next?**

# Glucose targets

---

<b>Before meals</b>	<b>6.0 – 8.0 mmol/L</b>
<b>After meals</b>	<b>6.0 – 10.0 mmol/L</b>

# Insulin titration schedule

OPTIONS –  
TAKE YOUR  
PICK

# Titration algorithm

## Patient-led but supervised

Increase by  
2 units  
twice a  
week

Increase by  
1 unit every  
day

Titrate to morning fasting  
glucose levels. Aim for 6-8  
mmol/L

## Physician-led

Titrate once or twice a week

Mean FBG (mmol/L)	Change in insulin dose
< 4 or if severe hypo	Decrease by 4 units
4-5.9	Decrease by 2 units
6-6.9	No change
7-7.9	No change or + 2 units
8-10	Add 2-4 units
> 10	Add 4 units

After titration over 4 months, with 1-2 weekly review, Rose is now on 26 units glargine U300 before bed. Byetta was discontinued. Metformin and Diamicron were continued.

HbA1c 6.9%	Self - monitored blood glucose (mmol/L)								Comments
	Breakfast		Lunch		Dinner		Before Bed	Overnight	
	Before	After	Before	After	Before	After			
Day 1	6.5								
Day 2	5.9								
Day 3	6.1	7.3							
Day 4	6.1				5.8		8.0		
Day 5	5.8								
Day 6			6.4				8.3		
Day 7	6.0						7.8		



# When to stop sulphonylureas

---

PANEL DISCUSSION

## After sales service – the checklist

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Review oral medications

---

Hypoglycaemia management

---

Fit to drive guidelines and brochures

---

Driving licencing authority notification

---

NDSS – new forms

---

Travel management

---

Sick day and peri-operative management

---

Exercises advice

---

Alcohol advice

## Reviewing oral medications

---

Metformin to continue – reduce if intolerant or renal impairment

---

Sulphonylurea – stop when prandial insulin needed

---

DPP4 inhibitor – can continue, reduce if necessary with renal impairment

---

SGLT2 inhibitor – can continue, stop if eGFR too low

---

Review PBS restrictions



## Factors to consider

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Individualised glycaemic targets

---

Cardiovascular benefits

---

Renal benefits

---

Glucose lowering potency

---

Weight loss potential

---

Hypoglycaemia risk

---

Adherence

---

Needle load

---

Age

---

Costs

PBS  
restrictions:  
Insulin + one  
of the  
following:

---

**Prandial insulin – basal plus, basal  
bolus or mix insulins (premix or co-  
formulation) PLUS:**

---

GLP1-RA – only daily byetta  
not weekly

---

SGLT1 inhibitors

---

DPP4 inhibitors

---

TZD

# Follow up beyond initiating basal insulin



Review HbA1c target



Regular HbA1c and diary review



Microvascular  
complication screening

Retina, heart failure, renal  
impairment, peripheral  
vascular disease



Macrovascular  
complication screening

Coronary heart disease,  
Cerebral heart disease,  
abdominal aneurysms



Co-morbidities

Degenerative arthritis,  
liver/Biliary/Pancreatic  
pathology, Iron deficiency,  
malignancies



Look for hypoglycaemia

# Managing weight



Dietitian referral



Low calorie diet



Very low calorie diet



Saxenda injections



Bariatric surgery

**What if Rose's initial diary looks like this?  
Current medications are Janumet and Diamicron**

**Initial**

<b>Before</b> HbA1c 9.1%	Self - monitored blood glucose (mmol/L)						Before Bed	Overnight	Comments
	Breakfast		Lunch		Dinner				
	Before	After	Before	After	Before	After			
Day 1	11.5	16.8	12.0	15.9	12.1	18.6	16.8		
Day 2	12.8	16.4	13.2	17.7	12.7	17.5	15.4		
Day 3	13.1	17.2	12.7	15.6	13.1	17.7	15.8		

**Hospital ED?  
GLP1-RA?  
Straight to insulin?**

# Acute severe hyperglycaemia

MANAGEMENT

Hyperglycaemia  
emergencies:  
BSL >  
15mmol/L\*\*



**More than mild dehydration** with symptoms or signs of vascular compromise **with or without ketones**:

- Tachycardia >95 bpm
- Reduction from usual BP
- Postural hypo, dizzy, lethargy etc

Looks OK, seemingly mild dehydration **but ketones present**:

- Blood ketones >1.5 mmol/L or
- Urine ketones moderate or heavy

→ **consider hospital**

\*\*care in euglycaemic ketoacidosis

# Hyperosmolar hyperglycaemic state (HHS)

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- severe hyperglycemia
- extreme dehydration
- hyperosmolar plasma and
- altered consciousness

Not uncommon in T2D.

**Consider urgent hospitalisation**





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Insulin therapy is required when we run out of beta cells

---

Modern second generation basal insulins are easy to initiate and titrate in patients requiring insulin

---

Basal insulin is usually titrated to morning fasting BSL

---

There are a number of insulin titration algorithm available

---

There are a number of check list items after starting insulin

---

There are factors to consider when adding another agent to insulin

---

There are a number of conditions to look out for in patients who need insulin to get their HbA1c to target

In summary



Thank  
you

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