

The University of Auckland, The University of Waikato & NZSSD

PRESENTS



# PACIFIC DIABETES MANAGEMENT COURSE



Your session will start shortly

with support & facilitation from



Aotearoa Diabetes Collective

Your session will start shortly

Welcome to the 2025  
**Pacific Diabetes Management Course**



# Housekeeping

- Please stay on **mute** during the webinar
- You can ask questions anytime during the webinar using the **Q+A function**
  - Any question is fine and will be answered at the end of the session
  - You can **upvote** questions that you want answered first
  - You can also ask questions verbally at the end of the session – please use the hand function if able
- **Confidentiality is a must** – These sessions will be recorded and available in a public format
- **Respect** one another
  - This is a collaborative, non-judgemental learning environment for everyone

The University of Auckland, The University of Waikato & NZSSD

PRESENTS



# PACIFIC DIABETES MANAGEMENT COURSE



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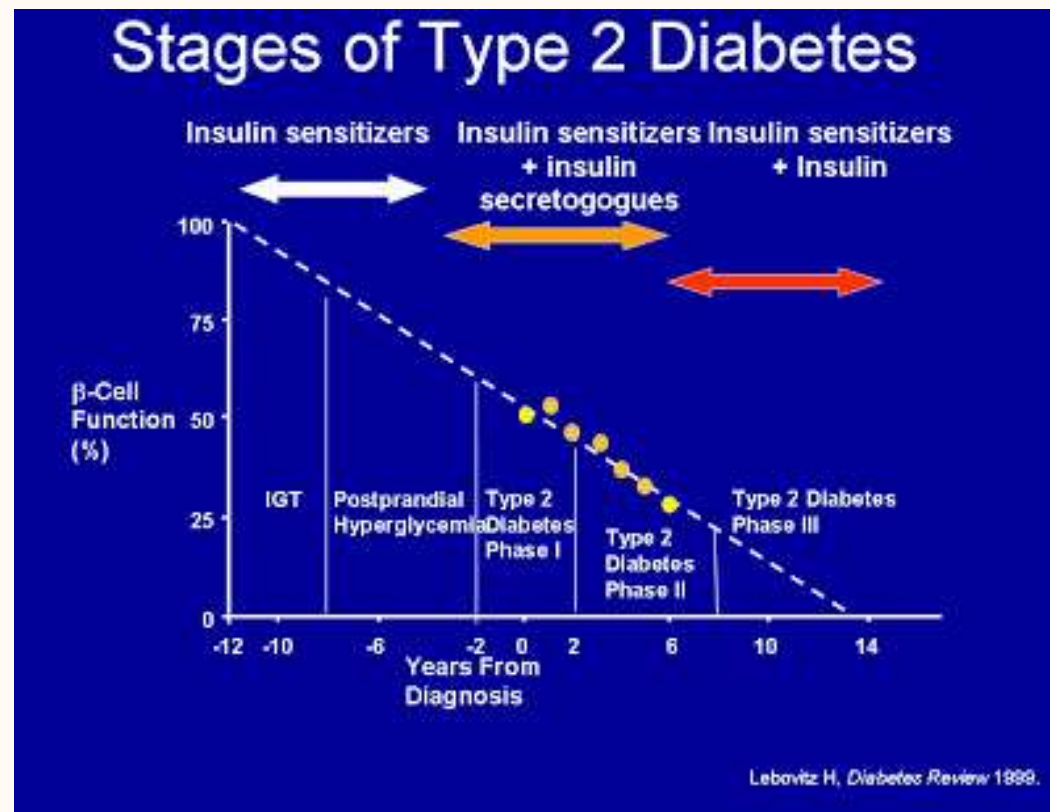
Aotearoa Diabetes Collective



Webinar 2.

## Sulfonylureas, Insulin + Management of hypoglycaemia

**Many patients will require sulfonylureas + insulin as T2D is a progressive disease**



# Sulfonylureas

# Sulfonylureas

- Increase insulin secretion by pancreatic beta cells → **may cause hypoglycaemia + weight gain**
  - Patients ideally need to monitor glucose levels for safety + titration of doses
  - Provide education on how to manage hypoglycaemia + safety around driving
- Maximal mean decrease in HbA1c ~ 15 mmol/mol + **do not** independently reduce CVD or renal disease
- 3 sulfonylureas available in Pacific - Gliclazide, glipizide + glibenclamide
  - Glibenclamide should not be used without specialist advice due to long half life
  - Sulfonylureas should be used in pregnancy, breastfeeding or end-stage liver or renal disease
  - Often first line management in steroid-induced hyperglycaemia

# Sulfonylureas

- Typically start with glipizide 2.5 mg or gliclazide 40 mg once with largest meal or twice daily
- Can double the dose every 1-2 weeks at appropriate meal if persistent postprandial hyperglycaemia
  - **Maximal doses - glipizide 10 mg twice daily + gliclazide 160 mg twice daily**
- Glipizide is typically the best sulfonylurea to use in renal impairment
  - **Often need to reduce dose of all sulfonylureas with ↓ renal function**
- Need to advise to stop sulfonylureas with decreased oral intake

# Insulin

# When do I need to start insulin?

- **Clinical features of insulin deficiency** e.g. polyuria, polydipsia, weight loss, prior DKA or HHS, low C-peptide
  - Low C-peptide is defined as fasting  $< 250$  pmol/L or post-meal  $< 600$  pmol/L with a paired glucose  $> 8$  mmol/L
- Strong suspicion of **type 1 diabetes** or **pancreatogenic diabetes**
- **HbA1c  $> 90$  mmol/mol** at any time
- **HbA1c above target** on maximal other glucose lowering therapies
  - Insulin often required in children, pregnancy, breastfeeding + end stage renal disease

# How do I start insulin?

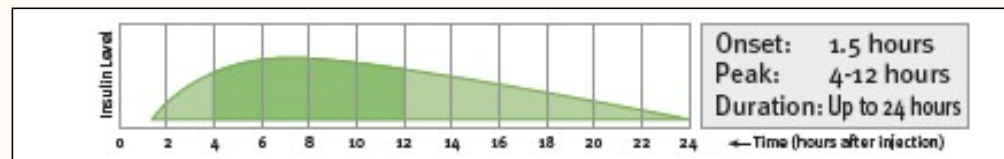
- Start with **weight-based dosing of isophane (Protaphane or Humulin NPH) or glargine (Lantus) insulin**
  - **0.2 units/kg/day if HbA1c > 64 mmol/mol + BMI > 18 kg/m<sup>2</sup>**
  - 0.1 units/kg/day if HbA1c < 64 mmol/mol or BMI < 18 kg/m<sup>2</sup> or elderly or renal/liver failure
  - **Best administered at night** as major role is to counteract hepatic gluconeogenesis
- Demonstrate + check injection technique & provide method of sharps disposal
- Provide education + written information on management of hypoglycaemia + sick days, & diabetes + driving
- Continue with lifestyle management + all other glucose lowering therapies → refer to dietitian if available

# How do I titrate insulin?

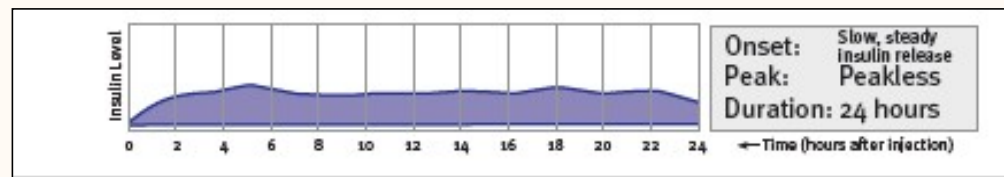
- Instruct the patient to monitor **fasting glucose levels** + provide **clear instructions** on how to self-titrate doses
  - **If 3 consecutive fasting levels > 7 mmol/L → increase dose of basal insulin by 10% OR 2 units**
  - Repeat every 3 consecutive fasting glucose levels but **STOP dose increases once:**
    - Any fasting glucose is < 7 mmol/L **OR**
    - Hypoglycaemia occurs **OR**
    - Doses reach 0.5 units/kg/per day
- If blood glucose levels throughout the day and/or HbA1c remain above target then **need to add meal time (prandial) insulin**
- Prandial insulin may be either **bolus insulin (Actrapid) OR premixed insulin (Mixtard)**
  - Choice between bolus or premixed insulin should be based on patient data + preference
  - Referral to dietitian/dietary advice is important to match insulin to carbohydrate intake

# Profiles of available insulins

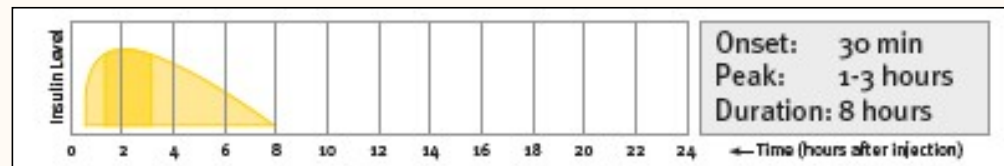
Protaphane



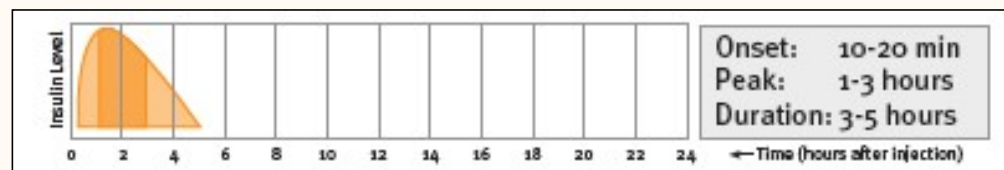
Lantus



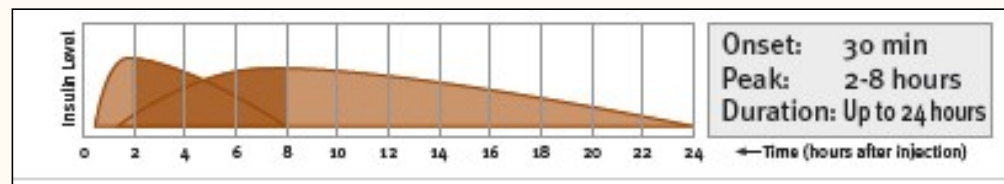
Actrapid



NovoRapid



Mixtard



# Do I choose bolus or premixed insulin?

| Favours basal-bolus                       | Factors to consider                                                           | Favours premixed                 |
|-------------------------------------------|-------------------------------------------------------------------------------|----------------------------------|
| Yes                                       | Needs flexibility for work patterns, exercise etc                             | No                               |
| Yes                                       | Prefers varied diet + timing of meals                                         | No                               |
| Yes                                       | Will likely need rapid intensification of insulin therapy                     | No                               |
| Good ability                              | Ability to inject (e.g. cognitive ability, dexterity, supervised environment) | Reduced ability                  |
| Comfortable with more frequent monitoring | Monitoring of glucose levels                                                  | Prefers less frequent monitoring |
| Comfortable with more frequent injections | Number of injections per day                                                  | Prefers fewer injections         |

**NB: Often patient preference biggest determining factor**

# How do I start bolus insulin?

- Start short-acting insulin (Actrapid) before largest meal
  - **Start at 4 units or 10% of dose of basal insulin with a maximum starting dose of 10 units**
- Monitor **glucose levels before + ~ 4 hours post meal** + provide **clear instructions** on how to self-titrate doses
  - If 3 consecutive rise in glucose levels with meals is  $> 3$  mmol/L  $\rightarrow$  increase dose of insulin by 2 units
  - Repeat every 3 consecutive measurements pre- and post-meals but **STOP dose increases once:**
    - Rise in glucose levels with meals  $< 3$  mmol/L OR if hypoglycaemia occurs
  - Continue all other management but stop sulfonylurea at that meal once established
- Add in **bolus insulin at other meals** if HbA1c  $>$  target OR if glucose levels rise by  $> 3$  mmol/L at other meals

# How do I start premixed insulin?

- **Start once daily Mixtard if predominantly one large meal per day**
- Convert daily dose of basal insulin to premixed insulin before largest meal
  - May choose to start premixed (Mixtard) insulin instead of basal (Protaphane) insulin
- Monitor **glucose levels before + ~ 4 hours post meal** + provide **clear instructions** on how to self-titrate doses
  - If 3 consecutive checks show meal rise  $> 3$  mmol/L **AND** fasting glucose  $> 7$  mmol/L  $\rightarrow$   **$\uparrow$  dose of insulin by 2 units**
  - **Stop dose increase** once rise with meals is  $< 3$  mmol/L **OR** fasting glucose  $< 7$  mmol/L **OR** hypoglycaemia occurs
  - Continue all other management but stop sulfonylurea at that meal once established

# How do I start premixed insulin?

- **Start twice daily Mixtard insulin if multiple meals per day**
- Convert daily dose of basal insulin to Mixtard insulin with  $\frac{1}{2}$  the dose pre-breakfast +  $\frac{1}{2}$  the dose pre-dinner
  - **Consider alternative ratio if large difference in meal sizes** e.g. 2/3rd of total dose at larger meal + 1/3<sup>rd</sup> at smaller meal
- Monitor **glucose levels before + ~ 4 hours post meal post breakfast + dinner** & provide **clear instructions** on how to self-titrate
  - If 3 consecutive BGL checks show breakfast rise  $> 3$  mmol/L **AND** pre-dinner glucose  $> 10$  mmol/L  $\rightarrow$   $\uparrow$  breakfast dose by 10%
  - If 3 consecutive BGL checks show dinner rise  $> 3$  mmol/L **AND** pre-breakfast glucose  $> 10$  mmol/L  $\rightarrow$   $\uparrow$  dinner dose by 10%
  - Stop increase in doses once meal rise is  $< 3$  mmol/L OR pre-meal glucose  $< 10$  mmol/L OR hypoglycaemia occurs
  - Continue all other management but stop sulfonylurea at that meal once established

# What do I do if the HbA1c is above target?

- If the HbA1c remains above target on premixed insulin then consider:
  - **Add in bolus insulin at other meals** → ideally space meals out to > 4-6 hours if possible
- If the HbA1c is still above target **OR** hypoglycaemia is problematic **OR** rigid routine problematic then **consider switching to basal bolus regimen:**
  - Easiest way is to convert total daily dose of insulin to 50% basal + 50% bolus insulin
    - E.g. Mixtard 25 units mane + 35 units nocte → 30 units Protaphane nocte + 10 units Actrapid with meals
    - May need to alter starting doses of bolus insulin based on meal sizes + risk of overnight hypoglycaemia → titrate as per normal
- If the HbA1c is above target on basal bolus regimen then consider dietitian referral + adding **correction insulin**

# How do I use correction insulin?

- Allows 'correction' of hyperglycaemia pre-meals or at times of reduced oral intake e.g. when unwell
- **Only use Actrapid insulin for correction insulin + do not repeat within 6 hours unless close monitoring**
  - Needs to be administered separately if on basal or premixed insulin alone
- **Use 1 unit for every x mmol > 6 mmol/L based on the total daily dose (TDD) of insulin**
  - TDD  $\leq 25$  units → correction 1 unit for every **4** mmol > 6 mmol/L
  - TDD **26 – 40** units → correction 1 unit for every **3** mmol > 6 mmol/L
  - TDD **41 – 75** units → correction 1 unit for every **2** mmol > 6 mmol/L
  - TDD  $\geq 76$  units → correction 1 unit for every **1** mmol > 6 mmol/L
- **Often safer to limit initial correction to 6 – 10 units + correct to 8 mmol/L if risk of hypoglycaemia**

# How do I use correction insulin?

- E.g. if on Protaphane 40 units + Actrapid insulin 10 units with meals → total daily dose is 70 units
  - Correction factor is **1 unit for every 2 mmol > 6 mmol/L** provide clear instructions on what dose to administer at each meal

| BGL (mmol/L) | Correction dose (units) |
|--------------|-------------------------|
| 4.0 – 7.9    | 0                       |
| 8 – 9.9      | 1                       |
| 10 – 11.9    | 2                       |
| 12 – 13.9    | 3                       |
| 14 – 15.9    | 4                       |
| 16 – 17.9    | 5                       |
| ≥ 18.0       | 6                       |

# How do I use correction insulin?

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| 12 – 13.9    | 3                       |
| 14 – 15.9    | 4                       |
| 16 – 17.9    | 5                       |
| ≥ 18.0       | 6                       |

# **Insulin management in type 1 diabetes**

# Insulin management in type 1 diabetes

- Insulin management is similar in type 1 diabetes but several key differences:
  - Start 0.1 units/kg Protaphane twice daily rather than 0.2 units/kg nocte
    - Consider 0.05 units/kg twice daily if risk of hypoglycaemia
  - Start Actrapid with meals  $\pm$  correction insulin early
    - Consider starting 2 units with meals if risk of hypoglycaemia
    - Basal bolus regimen typically preferred to premixed insulin
  - Monitoring glucose levels is essential for safety + titrating of insulin
    - Urinary ketones useful in illness if unable to check blood ketones
  - Consider switching Protaphane to Lantus insulin and Actrapid to NovoRapid insulin if available

# **Tips for insulin management**

# Tips for insulin management

- Ensure adherence + check injection technique if mismatch with glucose levels
- Ensure rotation of injection sites
  - Check for areas of lipohypertrophy at injection sites at least annually
- Premixed & cloudy insulin needs to be gently inverted before administering
- Remember doses of insulin may need to be reduced around exercise + in illness

# Tips for insulin management

- Refer to dietitians when starting bolus or premixed insulin + re-refer if issues
- Consider special strategies in cognitive impairment
- Developing a regular routine around insulin e.g. basal insulin at dinner may aid adherence
- Administer bolus + premixed insulin before meals → optimal doses of bolus insulin likely different at different meals

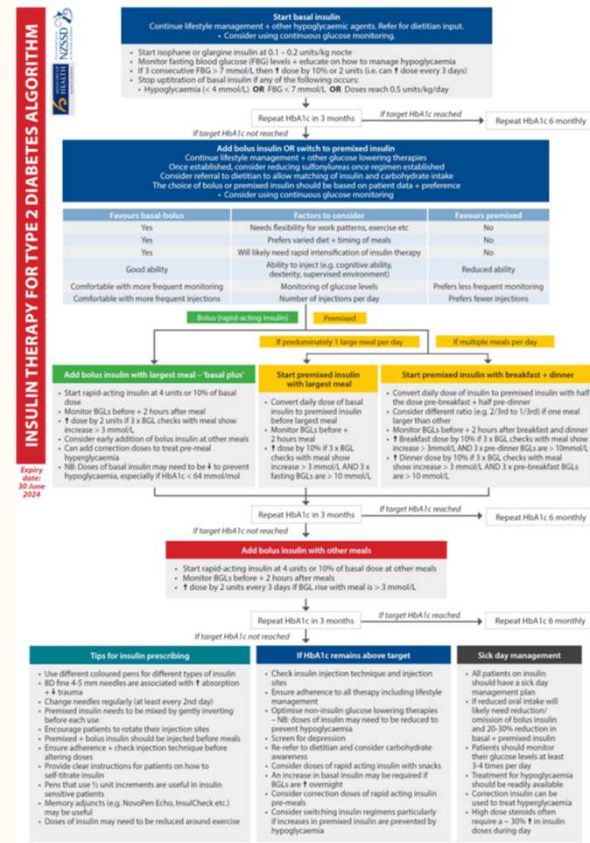
# Tips for insulin management

- Reassure patients + **reduce stigma around insulin**
  - Distraction, ice + other tools useful if significant pain
- Often need to reduce insulin doses by  $\geq 20\%$  if frequent episodes of hypoglycaemia or severe hypoglycaemia
  - NB: Need to reduce insulin doses with declining renal function to prevent hypoglycaemia
- Limit insulin induced weight gain
  - Maximise lifestyle management, metformin + other glucose lowering therapies
  - Provide accurate dietary advice → **patients should not need to eat avoid hypoglycaemia**
  - **Introduce prandial or meal time insulin early** → insulin requirements typically ~ 50% basal/50% bolus insulin
- Depression/diabetes distress often biggest barrier in reaching targets  
→ **screen for depression + utilise supports**

# Insulin algorithm

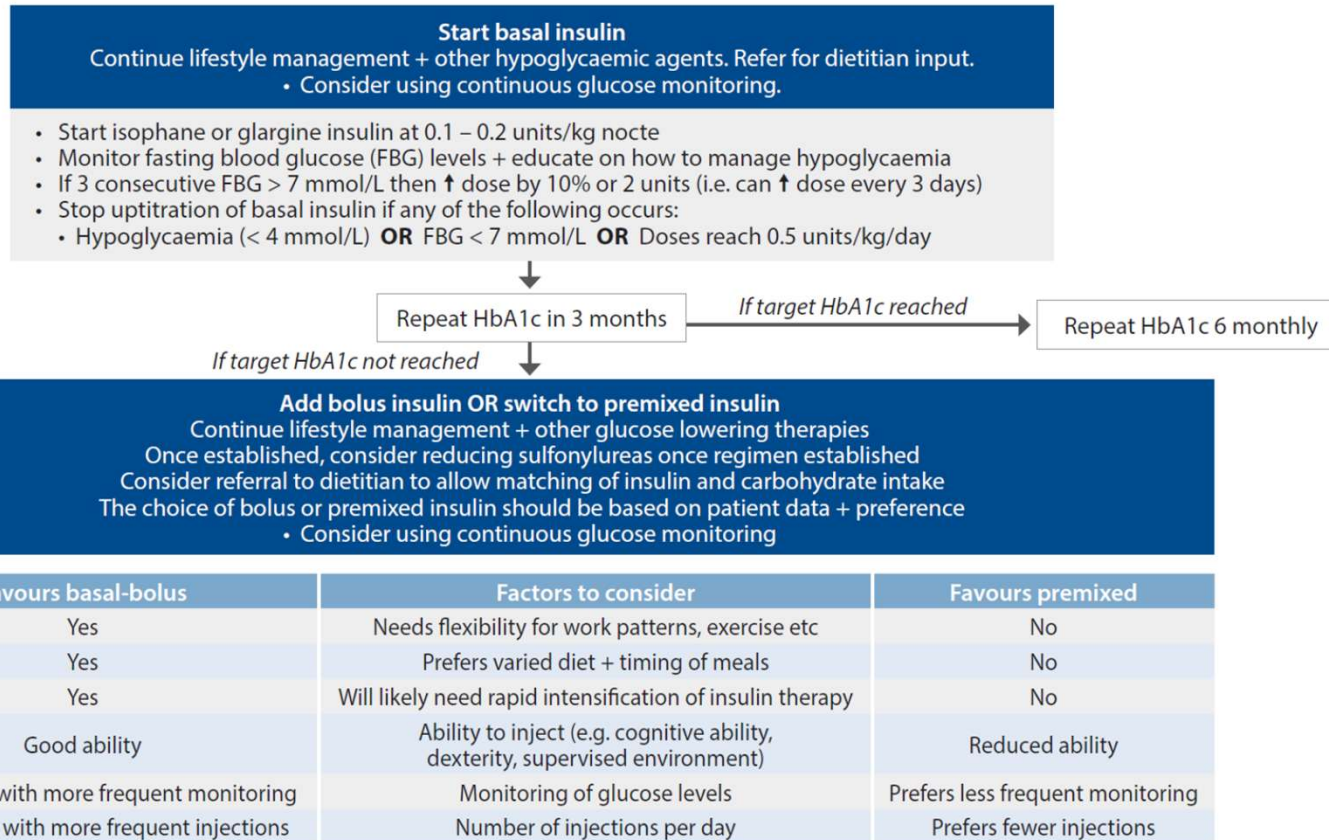
# www.t2dm.nzssd.org.nz

- View online [here](https://www.t2dm.nzssd.org.nz)
- Pdf available on Moodle under resources
- Download from NZSSD website [here](https://www.t2dm.nzssd.org.nz)



# Commencing insulin

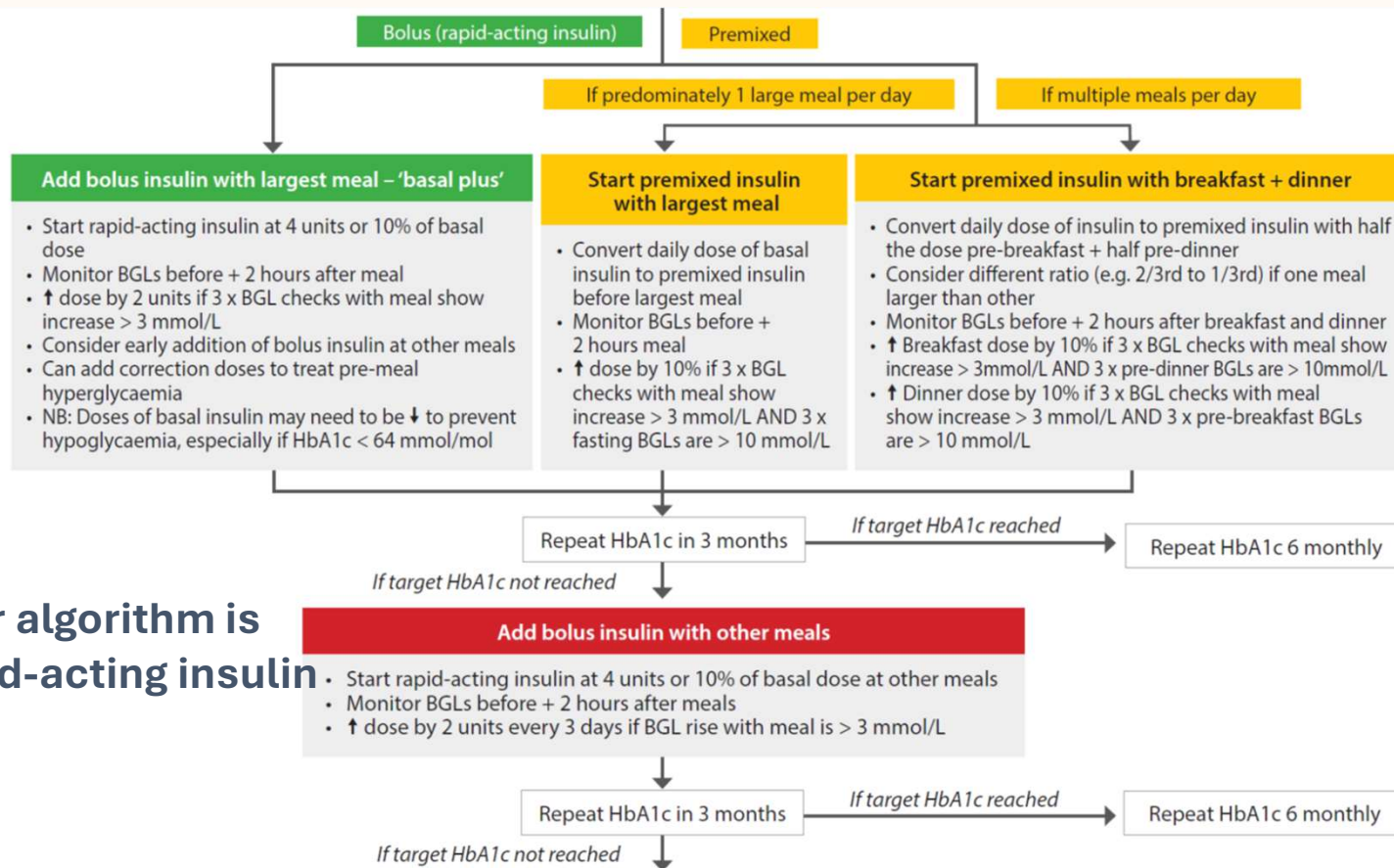
## FOR TYPE 2 DIABETES ALGORITHM



# Titrating insulin

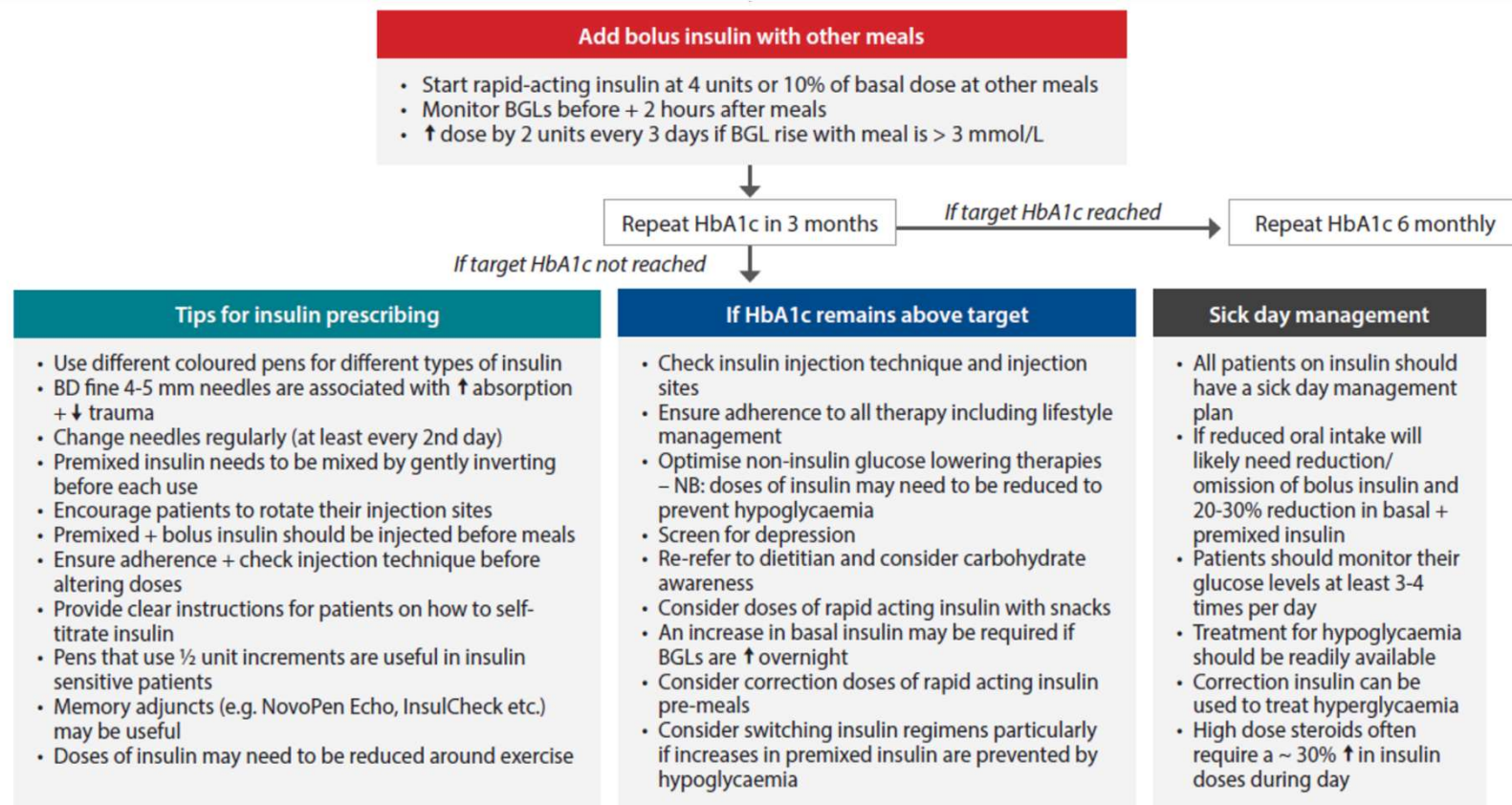
**INSULIN THERAPY**

Expiry date:  
30 June  
2024



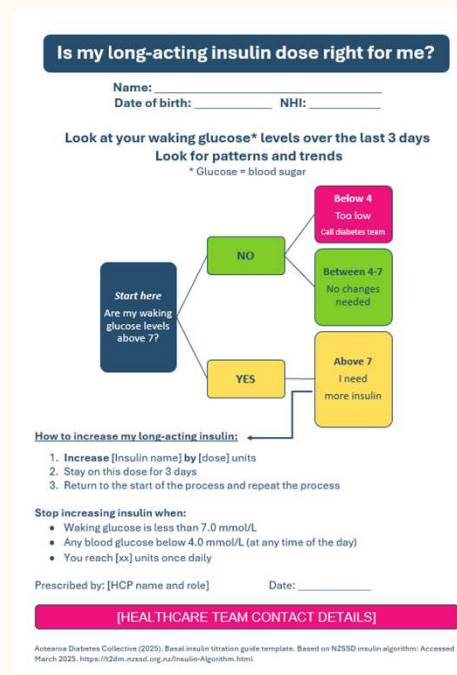
**NB: Remember algorithm is written for rapid-acting insulin**

# Tips for self-management



# Tips for self-management

- Create personalized self-titration sheets
- Download from [ADC website](#)



Flowchart version

**Is my long-acting insulin dose right for me?**

Name: \_\_\_\_\_  
Date of birth: \_\_\_\_\_ NHI: \_\_\_\_\_

Insulin name [insulin name]  
Current dose: \_\_\_\_ units [AM/PM]

**Steps:**

1. Check glucose when you wake up (before eating)
2. Look at the trend for 3 days in a row

| Fasting glucose levels | Day 1 | Day 2 | Day 3 |
|------------------------|-------|-------|-------|
| Above 7.0 mmol/L       |       |       |       |
| 4.0 – 7.0 mmol/L       |       |       |       |
| Under 4.0 mmol/L       |       |       |       |

**WARNING:** If you have any glucose levels are under 4.0 mmol/L call your diabetes team for help to **reduce your insulin dose**. Phone \_\_\_\_\_

3. If your fasting glucose levels are consistently **above 7.0mmol/L** then
4. **Increase your** [insulin name] **by** [enter dose] units [AM/PM]

**New dose:** \_\_\_\_ units of [insulin name] [AM/PM]

5. **Repeat the process**

**Stop increasing insulin when:**

- Waking glucose is less than 7.0 mmol/L
- Any blood glucose below 4.0 mmol/L (at any time of the day)
- You reach [x] units once daily

Prescribed by: [HCP name and role] Date: \_\_\_\_\_

[HEALTHCARE TEAM CONTACT DETAILS]

Antaresa Diabetes Collective (2025). Basal insulin titration guide template. Based on NZSSD insulin algorithm. Accessed March 2025. <https://t2dm.nzssd.org.nz/insulin-Algorithm.html>

Record BGLs version

# Management of hypoglycaemia

# Management of hypoglycaemia

- All patients on insulin and/or sulfonylureas should have a written plan on how to manage hypoglycaemia (< 4 mmol/L)
  - Include when patients should phone for an ambulance + contact practice
- **Best management of hypoglycaemia is weight based:**
  - 30 g of rapid-acting carbohydrate if weight > 70 kg
  - 15 g of rapid-acting carbohydrate if weight < 70 kg or type 1 diabetes

**WARNING:** Complex carbohydrates (e.g. bread) or carbohydrates mixed with fat and/or protein (e.g. chocolate) are NOT good treatments for hypoglycaemia

# Management of hypoglycaemia

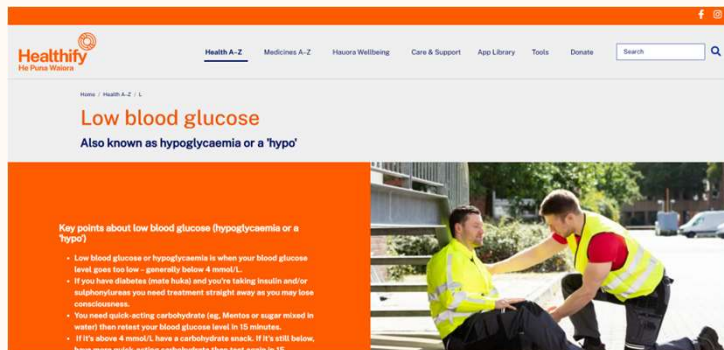
| Type 2 diabetes < 70 kg or type 1 diabetes<br>15 grams of glucose | Type 2 diabetes >70 kg<br>30 grams of glucose             |
|-------------------------------------------------------------------|-----------------------------------------------------------|
| 15 g of glucose powder                                            | 30 g of glucose powder                                    |
| 3 teaspoons of sugar dissolved in water                           | 6 teaspoons of sugar dissolved in water                   |
| 175 mL of fruit juice or non-diet (full sugar) soft drink         | 350 mL of fruit juice or non-diet (full sugar) soft drink |
| 9 jellybeans                                                      | 18 jellybeans                                             |
| 1 tablespoons of honey or 1.5 tablespoons of jam                  | 2 tablespoons of honey or 3 tablespoons of jam            |
| 1 hypofit gels or 1x 15g Hypopak                                  | 2 hypofit gels or 1x 30g Hypopak                          |
| 5 Dextro or Vita glucose tablets or 3 BD glucose tablets          | 10 Dextro or Vita glucose tablets or 6 BD glucose tablets |

# Management of hypoglycaemia

- Check glucose levels again in 15 minutes
  - If glucose levels still  $< 4$  mmol/L → **repeat** 30 g of rapid acting carbohydrate + re-check glucose levels in 15 mins
  - If glucose levels  $> 4$  mmol/L → have next meal if due OR carbohydrate snack e.g. a piece of toast, 2 biscuits etc.
    - Recheck glucose levels in 30 mins to ensure still  $> 4$  mmol/L
- **If patient is unresponsive or unable to take oral carbohydrate → phone 111**
  - Then attempt to administer glucose buccally if able + available
  - If buccal glucose not available → administer Glucagon 1 mg IM
- Following event determine cause + alter regimen as required
  - NB: ~ 80% of 'accidental' insulin overdoses are actually intentional

# Management of hypoglycaemia

- Available to download on [ADC website](#)
- Available on [Healthify](#)



**Hypoglycaemia**  
How to treat a low blood glucose level when you have **type 2 diabetes** (adult)

**Examples of 15 grams of glucose**  
If you have Type 2 Diabetes and **weigh less than 70kg**

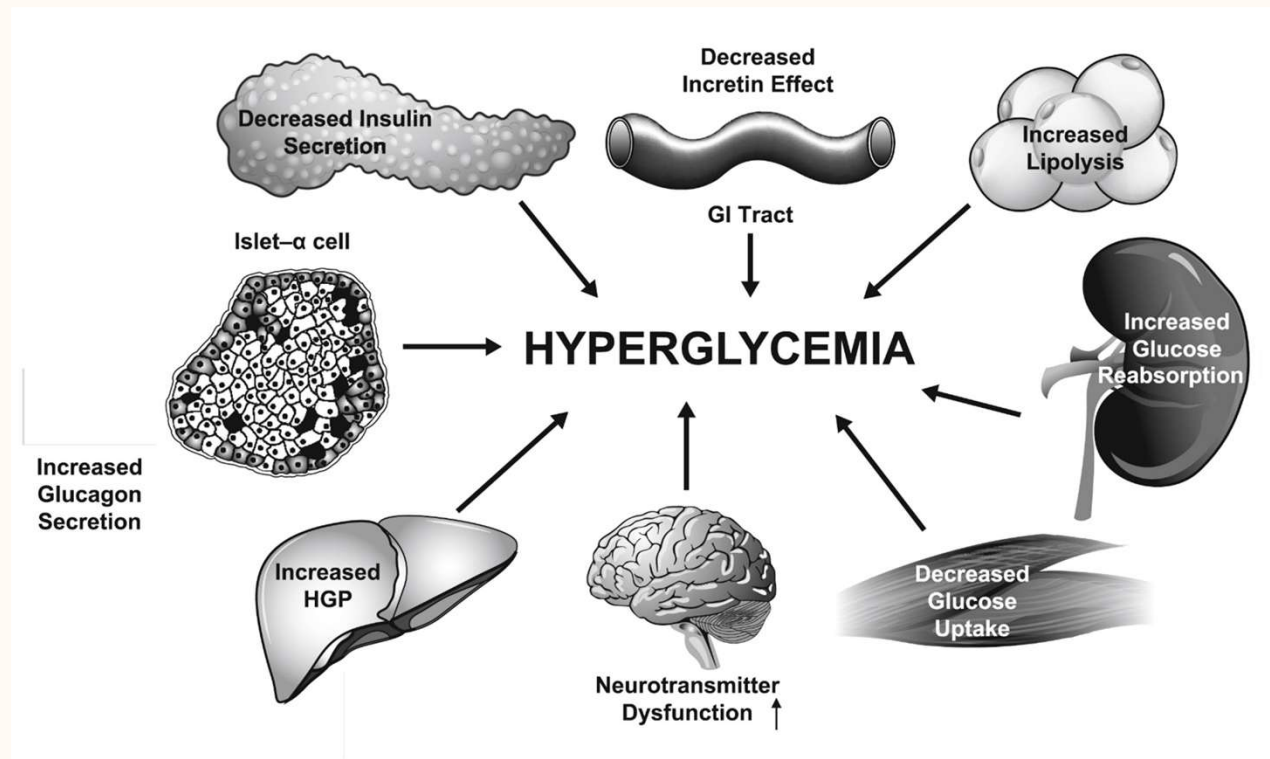
- 9 small jelly beans
- 3 teaspoons of sugar (in water)
- HALF a can of (full sugar) fizzy drink
- 1 small juice box
- 1 hypo-fit gel
- 5 dextrose tablets
- 5 mentos lollies

**Examples of 30 grams of glucose**  
If you have Type 2 Diabetes and **weigh more than 70kg**

- 18 small jelly beans
- 6 teaspoons of sugar
- FULL can of (full sugar) fizzy drink
- 2 small juice boxes
- 2 hypo-fit gels
- 10 dextrose tablets
- 10 mentos

Hypoglycaemia - Type 2 diabetes adult | Aotearoa Diabetes Collective February 2025

# The 'ominous octet'



Thrasher. Am J Card 2017

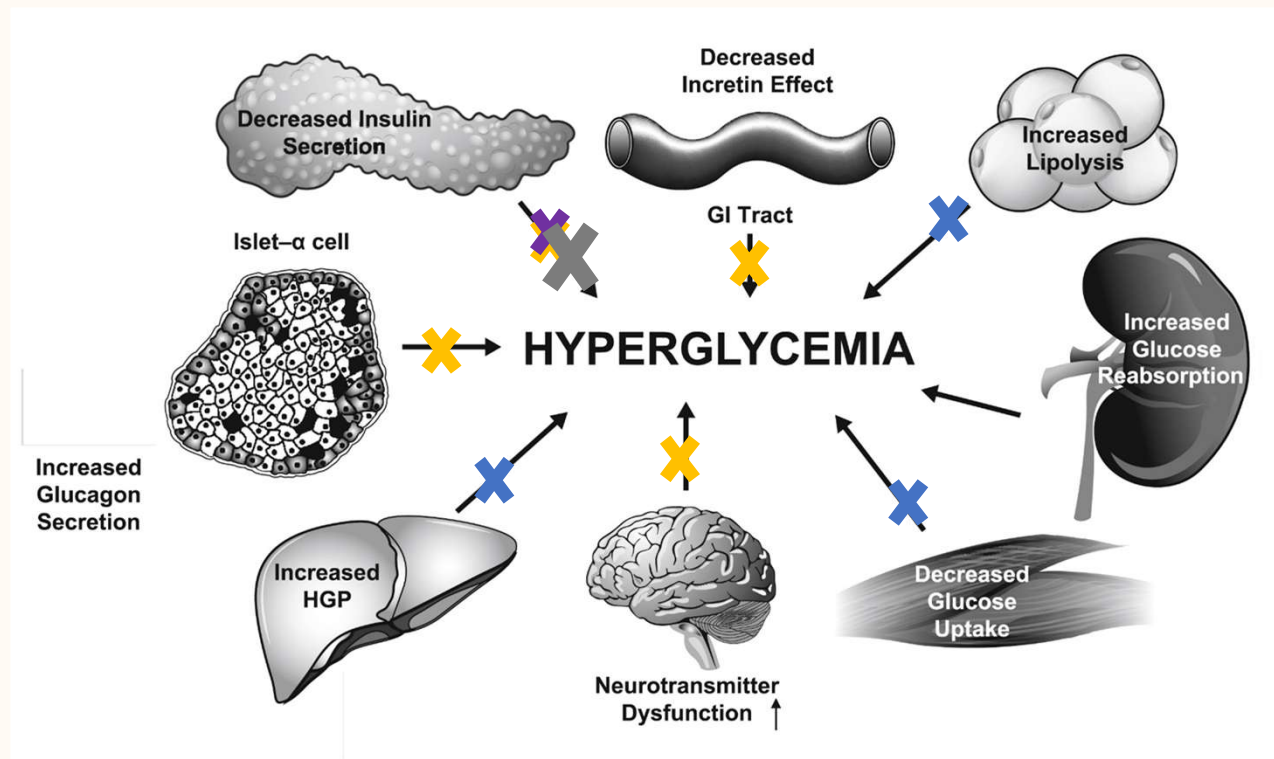
# The 'ominous octet'

Metformin

Vildagliptin

Sulfonylureas

Insulin



# Summary of glucose lowering therapies

|                                   | Metformin | Vildagliptin | Sulfonylureas | Insulin |
|-----------------------------------|-----------|--------------|---------------|---------|
| Risk of hypoglycaemia             | Rare      | Rare         | Yes (mild)    | Yes     |
| Mean maximal HbA1c ↓              | 15        | 5-10         | 15            | Any     |
| Independent cardio-renal benefits | Yes       | No           | No            | No      |
| Effect on weight                  | ↓         | ↔            | ↑             | ↑↑      |

**What are the take home messages?**

## Take home messages

- Sulfonylureas + insulin still retain an **important role in managing T2D** due to its progressive nature
- Starting weight-based insulin + introducing prandial insulin early is important in reducing clinical inertia
  - Bolus + premixed insulin are both effective forms of prandial insulin
- **Self-titration** of insulin can be very successful in reducing clinical inertia when appropriate
- **Weight-based management of hypoglycaemia is best to avoid under or over-treatment**

# Upcoming webinars

|   |                                                                                                                                                                                                                                                 |                           |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1 | <b>Lifestyle management, Metformin &amp; Vildagliptin</b><br>Niue - Monday September 8 <sup>th</sup> at 6pm<br>Cook Islands - Monday September 8 <sup>th</sup> at 7pm<br>Aotearoa, NZ - Tuesday September 9 <sup>th</sup> at 5pm                | <a href="#">Zoom link</a> |
| 2 | <b>Sulfonylureas &amp; Insulin + Management of Hypoglycaemia</b><br>Niue - Monday September 15 <sup>th</sup> at 6pm<br>Cook Islands - Monday September 15 <sup>th</sup> at 7pm<br>Aotearoa, NZ - Tuesday September 16 <sup>th</sup> at 5pm      | <a href="#">Zoom link</a> |
| 3 | <b>New Diabetes Medication, Technology &amp; Management algorithm</b><br>Niue - Monday September 22 <sup>nd</sup> at 6pm<br>Cook Islands - Monday September 22 <sup>nd</sup> at 7pm<br>Aotearoa, NZ - Tuesday September 23 <sup>rd</sup> at 5pm | <a href="#">Zoom link</a> |
| 4 | <b>Glycaemic, Blood Pressure &amp; Lipid Targets + Management</b><br>Niue - Monday September 29 <sup>th</sup> at 6pm<br>Cook Islands - Monday September 29 <sup>th</sup> at 7pm<br>Aotearoa, NZ - Tuesday September 30 <sup>th</sup> at 5pm     | <a href="#">Zoom link</a> |
| 5 | <b>Diabetes and Sick Day Management, Driving &amp; Pregnancy</b><br>Niue - Monday October 6 <sup>th</sup> at 6pm<br>Cook Islands - Monday October 6 <sup>th</sup> at 7pm<br>Aotearoa, NZ - Tuesday October 7 <sup>th</sup> at 5pm               | <a href="#">Zoom link</a> |
| 6 | <b>Management of Complications Related to Diabetes</b><br>Niue - Monday October 13 <sup>th</sup> at 6pm<br>Cook Islands - Monday October 13 <sup>th</sup> at 7pm<br>Aotearoa, NZ - Tuesday October 14 <sup>th</sup> at 5pm                      | <a href="#">Zoom link</a> |
| 7 | <b>Inpatient Management of Diabetes</b><br>Niue - Monday October 20 <sup>th</sup> at 6pm<br>Cook Islands - Monday October 20 <sup>th</sup> at 7pm<br>Aotearoa, NZ - Tuesday October 21 <sup>st</sup> at 5pm                                     | <a href="#">Zoom link</a> |

# Discussion