

# Part 1: Blood glucose monitoring – Hyperglycaemia

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James talks to Glynis Ross about blood glucose monitoring and hyperglycaemia on the wards in patients with diabetes. In Part 2 of the discussion around managing deranged blood glucose levels on the wards we focus on [hypoglycaemia](#).

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## About Glynis Ross

Associate Professor Glynis Ross is a Visiting [Endocrinologist](#) at Royal Prince Alfred Hospital and part-time Senior Staff Specialist at Bankstown-Lidcombe Hospital, Sydney. She has been in charge of the Diabetes in Pregnancy Service at Royal Prince Alfred Women's and Babies' Hospital for over 25 years.

Glynis was a member of the Australasian Diabetes in Pregnancy Society ([ADIPS](#)) Council from 1991-1998 and 2002-2012, and President from 2008-2010. She has been on the Australian Diabetes Society Council since 2012 and is currently Vice-President and President-Elect. Her major clinical and research interests are Diabetes in Pregnancy, Type 1 Diabetes, Insulin Pump Therapy and [In-patient Diabetes Management](#). Dr Ross serves on State and National Working Parties in these areas. She is involved in the teaching programs of trainees of the Australasian Colleges of Anaesthetics, Obstetrics & Gynaecology, and Physicians, as well as education programmes for Midwives, General Practitioners and Medical Undergraduates.

## Part 1: Blood glucose monitoring–Hyperglycaemia

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*With Associate Professor Glynis Ross, Endocrinologist at Royal Prince Alfred Hospital, Sydney, Australia*

### Introduction

Diabetes is a common condition, with about 30% of inpatients having diabetes. The majority of patients have type 2 diabetes, about 10% having type 1 diabetes, and a smaller subset having an alternate cause such as pancreatic or monogenic. There are also temporary forms of diabetes such as steroid-induced or gestational diabetes in people at higher risk of diabetes. Additionally, a large number of people have insulin resistance, a prediabetes state.



#### 1. Concerns with hyperglycaemia

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- Increased risk of infection, including post-operative wound infection
- Slower wound healing post-operatively
- Increased length of stay in hospital
- If blood glucose levels (BGLs) are very high, hyperosmolar hyperglycaemic non-ketotic syndrome or diabetic ketoacidosis

## 2. How do you diagnose diabetes?

- As an inpatient, it is difficult to confirm because being acutely unwell compromises results
- As an outpatient, two of the following tests or one test and unequivocal symptoms of hyperglycaemia
  - Fasting plasma glucose (FPG) values  $\geq 7.0$  mmol/L
  - Two-hour plasma glucose values of  $\geq 11.1$  mmol/L
  - HbA1c values  $\geq 6.5$  %
    - However, HbA1c can be falsely negative
    - It is also possible to have an HbA1c below this but still have diabetes

## 3. Classification of diabetes

- **Type 2 diabetes: 80-90% of patients**
  - Typical age of onset  $>30$  years old, but increasingly seeing cases in younger patients, including teens and subteens.
  - Pathophysiology: Insulin resistance with loss of beta cell insulin production, the disease progresses over time.
- **Type 1 diabetes: ~10%**
  - Typical age of onset  $<30$  years old, but can present at any age.
  - Pathophysiology: Autoimmune
  - Diagnosis strongly suggested with anti-GAD antibodies, anti-Ia2, anti-ZnT8 transporter antibodies.
  - Additionally, C-peptide levels, which reflect a patient's own production of insulin will be low.

## Case

You are a junior doctor on the ward and you have been asked to see a patient with a BGL of 14 mmol/L.

## 1. What should you ask the nurse over the phone?

- Is the patient well or unwell?
  - If the patient is unwell you need to see the patient sooner.
- Have there been any other blood glucose levels? Were they normal? What is the trend?
  - If it is a one off, you may not need to do anything, the BGL should be rechecked because confounders can exist such as glucose on hands from food.

## 2. Should you give a phone order for a short acting insulin?

- No, 14mmol/L is not a very high blood glucose level and there should not be knee-jerk reaction to order short acting insulin.
- The patient should have ongoing blood glucose monitoring and be reviewed to identify the cause of the elevated BGL.

## 3. Should you give a phone order for a short acting insulin?

- Assess for symptoms of hyperglycaemia.
- Detailed food history.
- Check HbA1c if not already done; urgent electrolytes, bicarbonate and blood ketones – to exclude possible type 1 diabetes and evolving ketoacidosis.
  - If you suspect type 1 diabetes or there are positive blood ketones (>0.6), you should consult the endocrinology team.
- When starting medication in hospital, insulin is generally the first choice.
  - Insulin should be charted as the “three B’s”.
    - Basal insulin, long acting insulin, calculation is weight based.
    - Bolus insulin, cover for meal requirement.
    - Booster insulin, correction of blood glucose level.

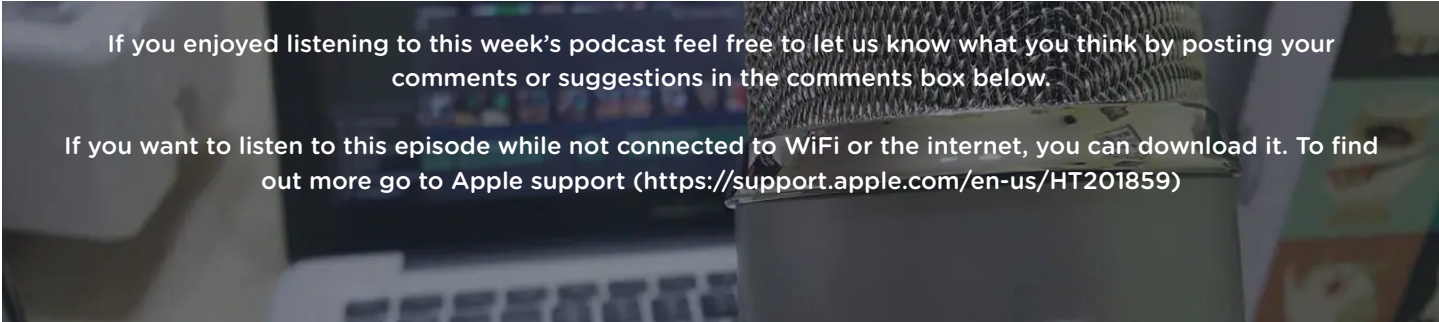
## 4. What are some cases to watch out for?

- Patients on SGLT2 inhibitors are at risk of euglycaemic ketoacidosis, especially when oral intake is very low such as in perioperative situations.
  - SGLT2 inhibitors: Forxiga (Dapagliflozin), Jardiance (Empagliflozin).

## Related Podcasts

- [Part 2: Blood glucose monitoring - Hypoglycaemia](#)
- [Type 2 Diabetes](#)

**Tags:** #BGL,#Blood glucose management,#BSL,#diabetes,#endocrinology,#euglycaemic ketoacidosis,#Hyperglycaemia,#insulin,#SGLT2 inhibitors,#three Bs,#Type 1 diabetes,#Type 2 diabetes



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