CASE 8 Unwell insulin-dependent diabetic

INFORMATION FOR THE DOCTOR

This is a telephone consultation.

Name	Michael Ede
Age	29
Past medical history	• Type 1 diabetes 2 years ago • Patello-femoral knee joint pain syndrome 4 years ago

The medical record of his **last consultation** last month, when he was seen by the practice nurse, reads:

"Patient was diagnosed with type 1 diabetes two years ago. His diabetic control is good and his recent IFCC A1C was 56.

Has had flu vaccination previously with no problems. Comes for flu vaccination today. Offered pneumococcal vaccination – accepted.

Patient is able to self-monitor his blood glucose and is well-educated and motivated in diabetes self-care. Will telephone for advice if develops side-effects to vaccination."

Current medication	• Levemir pen fill injections 100units/ml • Novorapid pen fill cartridges 100units/ml • Novo pens 3 and 4: 1–60units • Glucose oral gel 40% • Glucagen Hypokit injection 1mg • Test strips • Ketone strips

INFORMATION FOR THE PATIENT

You are Michael Ede, a 29-year-old engineer. You were diagnosed with Type 1 diabetes after a sudden short illness 2 years ago. Since the diagnosis you have taken a very proactive approach to optimising your blood sugar management. Over the past year your insulin control has improved – you had 3 episodes of hypoglycaemia in the first year but you have not had any episodes of hypoglycaemia in the last year. You check your BG 8 to 10 times per day.

You are calling the GP today because you became suddenly unwell during the night and seek advice on adjusting your insulin. Since 1 am you felt unwell: it started with feeling hot, then cold, shivering and sweating. Then the diarrhoea and vomiting started – fluid, no blood, on the hour. You last vomited two hours ago, after which you checked your BG. It was 9. You have been taking sips of water, but feel unable to eat.

Your opening statement is *"I've got pretty bad D&V doctor, but Dioralyte and squashes have too much sugar. What should I drink?"*

Information to reveal if asked

General information about yourself:

- You were part of the University research trial and learnt on a two-week residential course a huge amount on how to match your carbohydrate requirements with exercise demands.
- You are physically very active. Since the course, you exercise for one hour per day, 5 days per week and you have not had any episodes of disabling hypoglycaemia.
- You also have normal awareness of hypoglycaemic symptoms. When you feel your blood glucose dropping (a vague sensation) you test yourself. If BG is <4, you are able to treat yourself with dextrose tablets and you recover quickly.
- Your work has made adjustments to your engineering job. You don't work at heights and you don't work alone on shifts. You tend to deal with work that is brought into the workshop; you do not drive to off-site calls. However, the company Occupational Medicine doctor advised you that your job will be reviewed if you start to have diabetes that is brittle and difficult to control. In particular, the company is worried about hypoglycaemia and the risk it poses to your ability to handle certain machinery or sign off safety-critical work.

Further details about your condition:

- You think you ate 'something bad' and developed food poisoning or an infectious illness.

- You feel 'dehydrated' – you have been to the toilet every hour and passed 'water'. You have been vomiting a lot but in the last two hours, you felt less nauseated.
- You have a few lower abdominal cramps when you pass stool but you do not have severe abdominal pain or urinary symptoms.
- You have not vomited blood or passed blood rectally.

Your ideas:

- You should rehydrate with something but you are not sure what fluid would be best.
- Should you take Dioralyte or squash and insulin?
- If you are not eating, should you cut your insulin?

Your concerns:

- You do not want to have hypoglycaemia because it has repercussions for work. You do not want to spoil your HbA1c reading next month.

Your expectations:

- You cannot get hold of your diabetic nurse at the University Hospital; you left a message for her to call back. In the interim, you expect the GP to give specific advice on how to rehydrate, what to eat and how much insulin to take. You do not recall being issued a copy of 'sick day rules'.

Medical history

2 years ago	Type 1 diabetes – sudden onset. You were told yours was an unusual presentation at your age.
4 years ago	Patello-femoral knee joint pain syndrome – exercise overuse from a three-week charity cycling event.

Social history

You got married a month ago. Your wife, who had the same sweet and sour chicken as you, is perfectly well.

Information to reveal if examined

Your last blood glucose was 9 and ketones trace (2 hours ago).

SUGGESTED APPROACH TO THE CONSULTATION

Targeted history taking:

- When did Michael last eat or drink? Is he able to keep down fluids? When did he last pass urine?
- Does he have any abdominal pain or urinary symptoms to suggest this is a more severe or different infection?
- Is he feeling so unwell or drowsy that he is unable to make good decisions?
- Is he able to monitor his blood glucose and ketones regularly?
- Is he alone? If he becomes more unwell, is there someone with him to look after him or call for help if he deteriorates?

Targeted examination:

- Not needed.

Clinical management:

- Manage the D&V: fluids, paracetamol if temperature or abdominal cramp, food as tolerated; anti-emetics if needed (buccal, oral tablets or injectables).
- Fluid: the type of fluid used as fluid replacement can be milky drinks or fruit juice, but if the patient is not eating solids, soups or cereals are good alternatives. Aim for 100ml of fluid every hour or approximately three litres in 24 hours.
- Food: try fish, meat, chicken or toast.
- Insulin and monitoring (blood glucose and ketones): as a rule of thumb, diabetics are more likely to have high blood glucose readings (hyperglycaemia) during an intercurrent illness so do not omit the insulin. Sometimes higher than normal doses of insulin are needed (see algorithm below). Test BG and blood ketones every 4 hours.
- Since Michael's last BG was 9 and blood ketones showed a trace only, he should take his usual dose of long-acting (bolus) insulin. He calculates his short-acting insulin dose in the usual way, based on the amount of carbohydrate he obtains from his intake of fluids (juice/soup) and food (fish, meat, chicken).
- He may require admission if:
  - the diarrhoea and vomiting are persistent.
  - blood glucose persistently >20mmol/L despite best therapy.
  - ketosis (+ and over) persists despite increasing the insulin dose or if the patient develops clinical signs of ketosis (e.g. Kussmaul's respiration, severe dehydration, abdominal pain).

- the patient is unable to manage the sick day rules – poor understanding or too unwell to make sensible decisions.
- it is unsafe to leave the patient alone, without social support where he may be at risk of slipping into unconsciousness.

Interpersonal skills:

This case tests the doctor's ability to assess and manage an 'emergency' presentation. The patient, though currently well, could become unwell quite quickly. The doctor needs to assess the situation systematically and make a diagnosis on probability. Even if the doctor does not have an emergency protocol to hand, he or she is able to give sensible advice (from first principles) on fluid, calories and insulin. The doctor is able to spell out for the patient the symptoms and signs that signal deterioration, so he is empowered to seek emergency care or admission; the doctor safety-nets appropriately.

Summary of information:

The patient monitors:

- Fluid intake
- Carbohydrate intake
- 4 hourly blood glucose
- 4 hourly blood ketones

List treatment:

- Fluid replacement
- Adequate carbohydrate and calorie intake
- Insulin usual or increased dose as determined by 4 hourly BG and blood ketones

BACKGROUND KNOWLEDGE REQUIRED FOR THIS CASE

NICE (CG15, July 2004) ***Type 1 diabetes: guidance and guidelines***
www.nice.org.uk/guidance/cg15.CG

http://www.diabetes-support.org.uk/info/?page_id=141

Dafne uses two categories of illness: **minor**, where blood glucose levels are not too elevated and ketones don't appear as more than a trace, and **severe**, where BG levels are over 13 or ketones are present.

Minor:

If BG is less than 8mmol/L and ketones are negative:

- Maintain usual ratios of bolus insulin.
- Maintain usual basal doses.
- Monitor 4–6 hourly. (If you are not eating, you may only need the basal

insulin.)

If BG is more than 8mmol/L and ketones are negative or trace:

- Maintain usual ratios of bolus insulin.
- Add corrective doses of bolus.
- Increase basal doses by 1–2 units (20%)
- Monitor 4–6 hourly. (If you are not eating, you may still need corrective bolus insulin.)

If BG is more than 13mmol/L and ketones are more than trace follow the "severe illness" rules.

Severe:

If BG is 10–13mmol/L and ketones are 'small' or 'moderate':

- Calculate the total insulin (basal and bolus) in the previous 24 hours, calculate 10% of that.
- Bolus: take equivalent of 10% of that daily total every 2 hours.
- Plus normal bolus ratio for anything you eat.
- Maintain usual basal doses. Monitor BG and ketones 2 hourly.
- Have 100ml of sugar-free liquids per hour.

When BG drops below 10mmol/L AND ketones are negative or trace:

- Eat/drink 10–20g carb.
- Use normal bolus ratios. Use normal basal dose.
- Monitor BG and ketones 2–4 hourly.

If BG is over 13mmol/L and ketones are 'moderate' or 'large':

- Calculate the total insulin (basal and bolus) in the previous 24 hours, calculate 20% of that.
- Bolus: take equivalent of 20% of that daily total every 2 hours, plus normal bolus ratio for anything you eat.
- Maintain usual basal doses.
- Monitor BG and ketones 2 hourly.
- Have 100ml of sugar-free liquids per hour.

When BG drops below 10mmol/L AND ketones are negative or trace:

- Eat/drink 10–20g carb.
- Use normal bolus ratios.
- Use normal basal dose.
- Monitor BG and ketones 2–4 hourly.