Diabetes mellitus

Case Study:

Day 1 Mr KB, a 61-year-old builder, came to his general practitioner (GP) because he had felt increasingly tired over the last few weeks and it was starting to affect his work. He also complained of feeling thirsty and of going to the toilet frequently to urinate, especially during the night, which was unusual for him. His late mother had a history of type 2 diabetes.
The GP dipped his urine, which was positive for glucose but not ketones and a trace of protein. His random blood sugar was 207 mg/dL and his blood pressure (BP) 156/90 mmHg. His previous medical history was osteoarthritis of the knee, for which he was taking the following medications:

- Diclofenac 50 mg orally three times daily after food
- Omeprazole 20 mg orally daily

The GP asked Mr KB to come back for a fasting blood glucose test the next morning.

Day 4 His fasting blood glucose was reported as 146 mg/dL (100–125). An appointment was made for Mr KB to see the clinical pharmacist to discuss the result.

Day 7 The clinical pharmacist explained to Mr KB that his reported symptoms plus one fasting plasma glucose ≥ 126 mg/dL confirmed a diagnosis of type 2 diabetes, and he discussed his diet and lifestyle and what impact this would have on his condition. Mr KB admitted to smoking 20–30 cigarettes per day, drinking 40 units of alcohol a week, eating lots of sugary and fatty foods and doing little physical activity. He was obese, with a weight of 105 kg (BMI 32 kg/m^2). Mr KB was advised to start modifying his diet and to increase his physical activity, building up to at least 30 minutes five times per week. He was also referred to the the dietitian and optician. A follow-up appointment was arranged for 1 month later.

Q1 What risk factors does Mr KB have for the development of type 2 diabetes?
Q2 What are the management priorities for Mr KB?
Q3 Would it be appropriate to prescribe Mr KB an anti-obesity drug?
Q4 How long should Mr KB be given to improve his glycaemic control through lifestyle measures before starting an oral hypoglycaemic agent?

Month 2 Mr KB returned to the clinical pharmacist. He was still feeling tired and urinating frequently, but preferred to continue diet control rather than start oral hypoglycaemic agents. Mr KB's foot assessment was unremarkable and general foot care advice was given. His BP at this visit was 158/96 mmHg and his weight was 103 kg. A random blood sugar level was 228 mg/dL. His serum biochemistry and haematology results were:

- HbA1c 8.6% (reference range 6.5–7.5%)
- TSH 3.9 mU/L (0.35–5.0)
- Albumin 39 g/dL (35–50)
- TC 235 mg/dL (<155)
- LDL-c 174 mg/dL (<100)
- Sodium 138 mmol/L (133–145)
- Potassium 4.1 mmol/L (3.5–5.2)
- Creatinine 0.8 mg/dL (0.5- 1)
- HDL-c 35 mg/dL (>45)
- ALT 46 IU/L (5–40)
- Estimated glomerular filtration rate (eGFR) 71 mL/min/1.73 m2

Q5 Which antihypertensive agents would be most appropriate for Mr KB, why? If it does not achieve optimum control, what else could be added to Mr KB's antihypertensive regimen?
Q6 Would you make any adjustment to Mr KB's pain relief therapy at this stage?

Q7 What other drug therapy should be initiated?

Month 4 Mr KB attended for his 3-month review. His current medication was:

- Aspirin dispersible 75 mg orally daily
- Paracetamol 1 g orally four times daily
- Ramipril 5 mg orally daily
- Simvastatin 40 mg orally at night

His BP had reduced and was now 144/88 mmHg. His weight had reduced to 101 kg. His HbA1c was 8.2%. He admitted to stopping simvastatin after 5 days as his legs were aching. He said he would prefer to lower his cholesterol by modifying his diet, and felt that he was already taking 'enough' tablets.

Q8 Which oral hypoglycaemic agent would you recommend for Mr KB and why?

Month 10 Mr KB's HbA1c was now 7.5%, his total cholesterol was 185 mg/dL and his weight 92 kg. He had made many dietary changes and was now more active, walking for at least 30 minutes every day. He had given up smoking and cut down his alcohol intake to 28 units per week. He complained of a dry cough, which had persisted for the last few weeks.

Q9 Which oral antidiabetic agents would you add in at this stage and why?

Year 5 Mr KB attended for his annual review. His BP was 148/86 mmHg and his HbA1c 8.0%. His weight had increased to 97 kg. He had struggled to maintain his weight loss as he found it hard to stop snacking now that he was no longer smoking. He was worried that he might be started on insulin at this appointment. His current medication was:

- Aspirin dispersible 75 mg orally daily
- Bendroflumethiazide 2.5 mg orally each morning
- Metformin 1 g orally twice daily
- Gliclazide 160 mg orally twice daily
- Ramipril 10 mg orally daily
- Simvastatin 40 mg orally at night
- Paracetamol 1 g orally four times daily

Q10 What insulin preparation would you recommend for Mr KB?