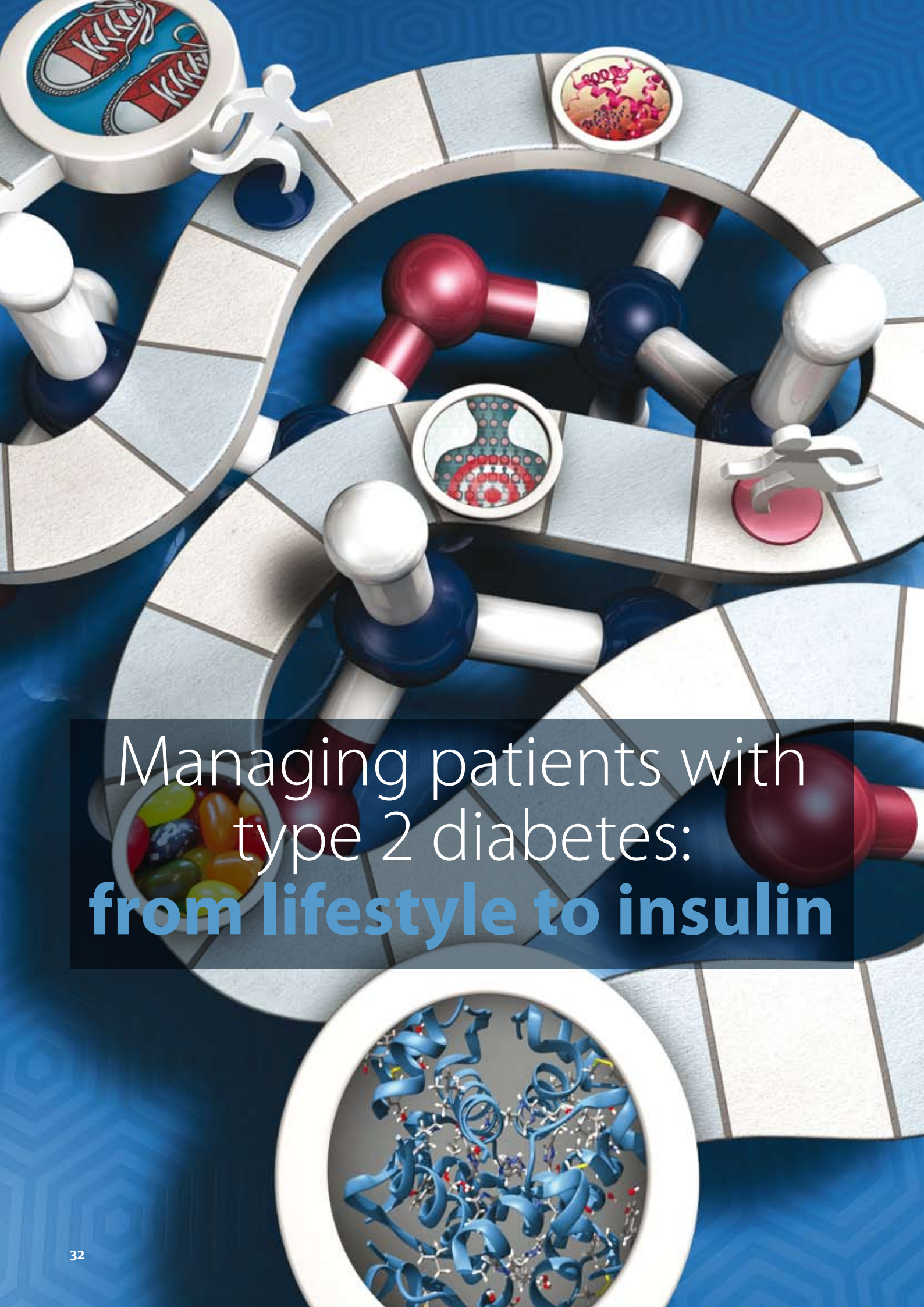

Managing patients with type 2 diabetes: **from lifestyle to insulin**

The management of type 2 diabetes is multi-faceted. Following diagnosis, patients require education to self-manage their condition and make lifestyle changes. Glycaemic targets need to be selected that are appropriate for the individual. Management should be regularly reviewed with timely offers of treatment intensification, including initiation of insulin. However, good glycaemic control is only one factor that influences outcomes in people with type 2 diabetes. Recent evidence has reiterated the benefits of managing cardiovascular risk factors in patients with type 2 diabetes.

Key practice points

- Emphasise the importance of lifestyle change as the foundation of all treatments for type 2 diabetes and ensure all patients have access to self-management education
- Glycaemic targets should be negotiated individually with patients using shared-decision making
- Management of type 2 diabetes requires regular review and timely intensification of treatment, including insulin initiation if appropriate
- Isophane is the recommended first-line insulin; initiation is managed in primary care
- Glycaemic control should always be managed in parallel with other cardiovascular risk factors

Diabetes management essentials

The number of people in New Zealand with diabetes is expected to double in the next 20 years, if current trends continue.[1] It is estimated that there are now 242 000 people in New Zealand with type 1 or type 2 diabetes, and a further 500 000 people with pre-diabetes (HbA_{1c} 41– 49 mmol/mol).[1] Overall, 6% of the adult population in New Zealand has been diagnosed with diabetes including Pacific peoples (9%), Māori (7%), Asian (6%) and people aged over 65 years (>10%).[2] There are also a substantial number of undiagnosed people in New Zealand with type 2 diabetes. A sample of over 4700 people found higher rates of undiagnosed diabetes in Pacific peoples (6.4%), compared with Māori (2.2%) and New Zealand European and Others (1.5%).[3]

A focus on Māori and Pacific peoples

Māori and Pacific peoples with diabetes are likely to benefit from more intensive management as they often have poor glycaemic control and may develop cardiovascular disease and renal damage more rapidly than New Zealand Europeans.[4] A review of almost 30 000 patients attending annual diabetes checks in New Zealand found the average HbA_{1c} was 68.6 mmol/mol for Pacific patients, 64.9 mmol/mol for Māori patients and 54.9 mmol/mol for New Zealand European patients.[4]

Information and statistics on diabetes care for individual DHBs is available from the Health Quality and Safety Commission's Atlas of Healthcare Variation, see: **www.hqsc.govt.nz/our-programmes/health-quality-evaluation/projects/atlas-of-healthcare-variation/diabetes/**

Management always begins with lifestyle

A healthy lifestyle is the foundation of treatment for all people with type 2 diabetes.[5] Weight reduction is effective for reducing blood pressure and improving lipid profile.[6] Patients can be encouraged to reduce their intake of saturated fat and trans fats and increase dietary fibre, e.g. whole grains.[6] A reduced portion size at meals may be appropriate for some people.

If agreed lifestyle goals are not achieved discussions should be initiated to help overcome barriers to change, regardless of diabetes duration or type of medicine being taken. If a patient has successfully made lifestyle changes but their glycaemic control is inadequate, the possibility of more intensive lifestyle changes may be discussed.

Patient education is part of diabetes management

Often people who have lived with diabetes for many years have a poor understanding of their condition.[7] Despite type 2 diabetes being a progressive disease some people may believe it will eventually "go away".[7] If a patient is able to achieve ongoing glycaemic control below the diagnostic threshold for diabetes they are considered to be in remission, rather than cured (see: "Diabetes remission can be achieved with very low calorie diets", Page 34).

Diabetes remission can be achieved with very low calorie diets

Diabetes remission is defined as glycaemic control below the diagnostic threshold for type 2 diabetes without the need for pharmacological or ongoing surgical treatment, e.g. repeated replacements of gastrointestinal devices.[10] The term remission acknowledges that people diagnosed with type 2 diabetes who have exceptional glycaemic control remain at risk of relapse due to aberrant physiology and/or genetic predisposition.[10] Diabetes remission can be achieved following bariatric surgery or significant weight loss.[10]

Emerging data shows that people with diabetes who consume very low calorie diets are able to achieve large reductions in HbA_{1c}, body weight and cardiovascular risk, at least in the short term.[11] These diets involve severe calorie restriction, e.g. eating less than 3350 kJ (800 calories) per day; this is difficult to achieve and sustain, and studies have reported drop-out rates as high as one-third.[11] Severe restrictions on calorie intake are only appropriate for highly motivated patients who are overweight. It is recommended that input from a dietitian and medical supervision be arranged before patients are initiated on very low calorie diets.

To date, studies investigating very low calorie diets have involved relatively small sample sizes and follow-up has been limited, therefore the long-term effectiveness of these diets is unknown. Patients who consume very low calorie diets require ongoing maintenance strategies to manage their weight. A systematic review of 17 studies found an average reduction in HbA_{1c} of approximately 15 mmol/mol, although variability between studies was high.[11] Patients lost an average of 13.2 kg and all studies reported significant reductions in systolic and diastolic blood pressure and total cholesterol.[11]

Further information is available from: **www.nhs.uk/Livewell/loseweight/Pages/very-low-calorie-diets.aspx**

Structured diabetes education is recognised in New Zealand as a critical aspect of treatment.[8] The goal is to enable the patient to take an active role in their own care.[8] The cultural needs of the patient and their family/whānau are important when considering education programmes.[8] Programmes that deliver education in face-to-face sessions are more likely to be effective, and those that offer ≥ 11 hours of contact have been shown to improve glycaemic control.[9]

Diabetes New Zealand has local branches throughout the country that provide a variety of services. For further information, see: **www.diabetes.org.nz/about_us/local_branches**

Glycaemic targets need to be individualised

Reducing hyperglycaemia decreases the onset and progression of microvascular complications such as retinopathy, nephropathy and neuropathy.[12] An HbA_{1c} target of 50 – 55 mmol/mol can be explained as the "speed-limit" for patients, i.e. measurements above this level are increasingly unsafe.[5] However, glycaemic targets need to take into account diabetes duration, the presence of co-morbidities, life expectancy, social circumstances and the personal beliefs and priorities of the patient.[12] This flexible approach acknowledges the importance of quality of life and maintenance of function, rather than focusing purely on glycaemic control.

In older people or those living alone, a less intensive target may be appropriate if there is a high risk of hypoglycaemia. Intensive blood glucose control can be harmful to older people with co-morbidities. For example, in people with diabetes and an average age over 60 years and concurrent cardiovascular disease or elevated cardiovascular risk, a glycaemic target of < 42 mmol/mol for more than three years was found to increase mortality.[13]

Conversely, the longer life expectancy of a younger person means a more stringent target may be appropriate due to the increased duration of exposure to hyperglycaemia. Glycaemic targets should be periodically reviewed and may need to be adjusted in response to changes in circumstance such as planning a pregnancy or becoming pregnant, a new medical condition or a change in social situation, e.g. living alone.

For further information see: "Getting to know patients with type 2 diabetes and poor glycaemic control: One size does not fit all", BPJ 58 (Feb, 2014) and "Monitoring diabetes before, during and after pregnancy", BT (Jul, 2015).

Intensifying diabetes treatment with oral medicines

Despite receiving treatment, many people with type 2 diabetes spend long periods with poorly controlled blood glucose. Regular review is therefore essential for improving glycaemic control in all patients with diabetes. Treatment adherence should be assessed in patients who are unable to meet glycaemic targets. Treatment intensification is encouraged in patients who are adherent with their medicines, but unable to meet targets. In general, intensification is appropriate if the patient's HbA_{1c} levels do not meet, or closely approach, an agreed target within three months.[5, 12]

Metformin remains the first-line medicine

Metformin remains the first-line pharmacological treatment for patients with type 2 diabetes because it is safe, effective, does not cause weight gain and provides patients with additional cardiovascular benefits.[5] There is a low threshold for initiation and metformin should be added at, or soon after, diagnosis for all patients with type 2 diabetes, unless there are contraindications (see below).[12] New Zealand guidelines recommend trialling lifestyle modification for three months in asymptomatic patients before beginning treatment with metformin.[5] In practice, however, metformin may often be initiated at diagnosis. International guidance increasingly suggests that patients with markedly elevated HbA_{1c} levels at diagnosis, e.g. ≥ 75 mmol/mol, should be initiated on multiple anti-diabetic medicines.[12] This approach to treatment may become more common in the future.

Metformin decreases glucose production by the liver and increases peripheral utilisation of glucose. Lactic acidosis can be expected to occur in one in every 10 000 patients taking metformin; a similar risk to other oral anti-diabetic medicines.[14] Metformin is contraindicated in patients with significant renal impairment.[15] The dose should be reviewed in patients with an eGFR < 45 mL/min/1.73m^2 and metformin is generally avoided in patients with an eGFR < 30 mL/min/1.73m^2.[15]

Patients taking metformin may experience gastrointestinal adverse effects which can be minimised with a low initial dose and slow titration, often to 1.5 – 2 g daily, in divided doses; the maximum daily dose is 3 g, in divided doses.[15] In patients with gastrointestinal adverse effects, a low dose of metformin is preferable to withdrawing treatment completely. Treatment should be temporarily withdrawn if the patient becomes dehydrated, acutely unwell or displays signs of ketoacidosis.[15]

For metformin dosing refer to the New Zealand Formulary (NZF): **www.nzf.org.nz/nzf_3715**

Adding a sulfonylurea

A sulfonylurea can be added to metformin for patients who have not reached an agreed HbA_{1c} target with metformin alone.[5] This class of medicine is most effective in people who have had type 2 diabetes for less than five years;[16] a lack of response may indicate a loss of functional pancreatic beta-cells. Sulfonylureas are contraindicated in patients with ketoacidosis or acute porphyria.[15]

Caution is required if a sulfonylurea is prescribed to an older patient or a patient with reduced renal function, due to the risk of hypoglycaemia.[15] Weight-gain is a common adverse effect of treatment with sulfonylureas.[15]

There are three sulfonylureas available in New Zealand: glipizide, gliclazide and glibenclamide. Glipizide and gliclazide are shorter-acting and are the preferred medicines.

For sulfonylurea dosing refer to the NZF: **www.nzf.org.nz/nzf_3691**

Acarbose is an alternative first-line treatment

Acarbose can be used as a first-line treatment for patients with type 2 diabetes where metformin or a sulfonylurea are contraindicated or not tolerated, or as an adjunctive treatment for patients taking metformin, a sulfonylurea or insulin.[5, 17] However, despite being safe, acarbose is not widely used as it is only mildly effective and is associated with significant gastrointestinal adverse effects (see below).[12] Acarbose reduces the amount of glucose absorbed in the small intestine by blocking the α-glucosidase enzyme, which breaks down complex carbohydrates into glucose.[16]

Acarbose is contraindicated in patients with inflammatory bowel disease, colonic ulceration, predisposition to, or history of, intestinal obstruction, large hernias or gastrointestinal disorders with malabsorption.[15] It should be avoided in patients with an eGFR < 25 mL/min/1.73m^2 or severe hepatic impairment.[15]

Acarbose tablets should be chewed with the first mouthful of food or swallowed whole with a drink immediately before eating.[15] Gastrointestinal adverse effects, e.g. flatulence and diarrhoea, are common, especially when sucrose or sucrose-containing foods are consumed.[15]

For acarbose dosing, refer to the NZF: **www.nzf.org.nz/nzf_3727**

Pioglitazone is an alternative to standard treatments

Pioglitazone may be appropriate when treatment with metformin and a sulfonylurea is not tolerated or contraindicated, or if an alternative to insulin is required, e.g. the patient would prefer trialling another oral medicine before initiating insulin.[5] Pioglitazone may also be used in combination with metformin and a sulfonylurea, or as an adjunctive treatment with metformin in patients who require escalating doses of insulin (see below).[12]

Pioglitazone, and other thiazolidinediones, bind to nuclear receptors in insulin sensitive tissues leading to a reduction in insulin resistance and improvements in glucose and lipid metabolism.[16] Medicines in this class are considered to be insulin sensitisers, like metformin, and do not cause hypoglycaemia.[12] The use of a thiazolidinedione can cause significant weight gain, peripheral oedema and the risk of heart failure is increased.[12] There is also an increased risk of bone fracture, particularly in post-menopausal females taking pioglitazone.[15] Despite the adverse effects, pioglitazone may be beneficial in patients for whom there is a limited number of treatment options. If pioglitazone is prescribed in combination with insulin low doses are recommended, with close monitoring for adverse effects.[12]

Pioglitazone is contraindicated in patients with a history of heart failure, non-investigated macroscopic haematuria or bladder cancer (see: "Pioglitazone and bladder cancer').[15] Patients taking a sulfonylurea or insulin may need dose adjustments after beginning treatment with pioglitazone due to an increased risk of hypoglycaemia associated with combination treatment.[15] Liver function testing is recommended before beginning treatment and periodically thereafter.[15] Advise patients to contact a health professional immediately if they develop symptoms suggestive of liver toxicity, i.e. nausea, vomiting, abdominal pain, fatigue, dark urine or jaundice.[15]

For pioglitazone dosing, refer to the NZF: **www.nzf.org.nz/nzf_3735**

Pioglitazone and bladder cancer: the controversy and the risk

Concerns that pioglitazone use is associated with an increased incidence of bladder cancer were first raised during preclinical trials in the 1990s.[18] A meta-analysis including five randomised controlled trials and 13 observational studies found a modest, but clinically significant, increase in the risk of bladder cancer; the larger the cumulative dose and the longer the duration of treatment, the greater the risk.[19] In 2011, the United States Food and Drug Administration (FDA) announced that labels for pioglitazone-containing medicines must include a warning that use for more than one year may be associated with an increased risk of bladder cancer.[20]

In contrast, a more recent study not included in the previous meta-analysis, with at least ten years follow-up, found that in more than 34 000 patients, treatment with pioglitazone was **not** associated with an increased risk of bladder, lung, endometrium, colon, rectum or kidney cancer, non-Hodgkin's lymphoma or melanoma.[21] The authors did note a 41% increased risk of pancreatic cancer and a 13% increased risk of prostate cancer associated with pioglitazone use.[21] However, other anti-diabetic medicines were also associated with an increased risk of pancreatic cancer suggesting reverse causality, i.e. that diabetes may increase the risk of pancreatic cancer.[21]

Due to the uncertainty surrounding pioglitazone and cancer risk it is helpful to take a pragmatic view. Bladder cancer is relatively uncommon and the absolute risk to patients due to pioglitazone exposure is likely to be small. The study that did find an association between pioglitazone treatment and bladder cancer calculated the number needed to harm (NNH) for one additional person to develop bladder cancer after more than two years cumulative treatment to be more than 1400.[19] The contraindication of previous or active bladder cancer means that patients at the highest risk will not be exposed to treatment with pioglitazone.

Newer anti-diabetic medicines that are approved but not subsidised

Incretin-modulating medicines act on incretins, which are intestinal hormones that control the post-prandial production of insulin and glucagon.[22] There are three incretin-modulating medicines approved for use, but not subsidised, in New Zealand:

- Exenatide is a GLP-1 agonist which increases postprandial insulin release and decreases glucagon secretion; given subcutaneously
- Sitagliptin and saxagliptin are oral DPP-IV inhibitors which block the enzyme which degrades incretins, thereby increasing the levels of endogenous hormones

Both DPP-IV inhibitors and GLP-1 agonists have a marked glucose-lowering effect that reduces post-prandial hyperglycaemia with no additional risk of hypoglycaemia.[16] Unlike sulfonylureas and thiazolidinediones, DPP-IV inhibitors do not cause weight gain and patients taking GLP-1 agonists can be expected to lose weight.[12] DPP-IV inhibitors and GLP-1 agonists are generally well tolerated and have relatively few adverse effects.

Due to concerns about pancreatitis and pancreatic cancer, the FDA and the European Medicines Agency conducted extensive independent reviews on the safety of medicines which interact with incretins. It was concluded that there was "no compelling evidence" of an increased risk of pancreatitis or pancreatic cancer in patients taking incretin-based medicines.[22] However, pancreatitis is still considered to be a risk associated with the use of these medicines until proven otherwise.[22] A recent review of three trials involving DPP-IV inhibitors in treating people with type 2 diabetes concluded that they lowered HbA_{1c} by 3.3 – 8.8 mmol/mol, but did not modify cardiovascular disease or mortality.[23] However, the follow-up periods in these studies ranged from 1.5 – 3 years which may not have been long enough to detect changes in cardiovascular outcomes.

The sodium-glucose co-transporter 2 (SGLT2) inhibitors are a new class of glucose lowering medicine. In New Zealand, dapagliflozin and canagliflozin are approved for use, but not subsidised. They are indicated as a first-line treatment for patients with type 2 diabetes who cannot tolerate metformin, or as an adjunctive treatment with metformin, sulfonylurea and/or insulin.[15]

The SGLT2 inhibitors have an HbA_{1c} lowering effect similar to other oral diabetes medicines.[12] These medicines are generally well tolerated and improve glycaemic control by reducing glucose absorption and increasing urinary glucose excretion by up to 80 g per day.[12] Due to their novel mechanism of action, SGLT2 inhibitors do not increase the risk of hypoglycaemia and they are effective in people with reduced pancreatic beta-cell function; although there is an increase in the risk of genital yeast infections,[12] as well as urinary tract infections.

Clinical trials have found that treatment with SGLT2 inhibitors is associated with reductions in HbA_{1c} of 5.5 – 11 mmol/mol, compared with placebo.[12] Patients can expect to lose 2 kg over six to 12 months of treatment and reduce systolic blood pressure by 2 – 4 mmHg and diastolic blood pressure by 1 – 2 mmHg.[12] A recent study of over 7000 patients found that the addition of a SGLT2 inhibitor (empagliflozin) to standard care for a median of 2.6 years resulted in significantly lower rates of death from cardiovascular causes, hospitalisation due to heart failure and all-cause mortality, compared with the addition of a placebo.[24] This study was discontinued early due to the cardiovascular benefits of treatment with empagliflozin. Similar cardiovascular outcomes studies are yet to report their findings, but it appears SGLT2 inhibitors will have an increasing role in the treatment of type 2 diabetes in the future.

Initiating insulin treatment

Insulin has a greater blood glucose lowering ability than any other hypoglycaemic medicine and it is eventually required by many people with type 2 diabetes.[16] However, a reluctance to initiate, by both patients and clinicians, often delays treatment.[16] Initiation of insulin in primary care should be considered for any patients with HbA_{1c} persistently greater than their individualised target (especially HbA_{1c} > 65 mmol/mol), despite optimal oral treatment,[5] particularly if they have signs such as ketonuria and weight loss.[16] Following initiation, insulin doses need to be titrated to optimise treatment.

Selecting an insulin regimen

The patient's blood glucose pattern, as determined by self-monitoring, is used to select an insulin treatment regimen.[5]

Isophane, once daily, at night: This regimen is appropriate for patients with high fasting blood glucose levels in the morning that either decrease or stay constant as the day progresses.[5] A recommended starting dose is 10 units of isophane, before bed.[5]

Isophane, once daily, before breakfast: This regimen is appropriate for patients with acceptable fasting blood glucose levels in the morning that rise throughout the day.[5] A recommended starting dose is 10 units of isophane, each morning.[5]

Isophane, twice daily: This regimen may be considered if the patient has high blood glucose levels during the day and at night, or if they are markedly hyperglycaemic.[5] A recommended starting dose is 6 – 10 units of isophane, morning and night.[5]

New Zealand guidelines recommend that treatment with a sulfonylurea be withdrawn in patients taking twice daily isophane.[5] However, in practice metformin and sulfonylureas are generally continued throughout treatment with basal insulin, such as isophane. When insulin therapy is intensified to include a short-acting insulin (e.g. with meals) sulfonylureas are withdrawn.

Some international guidance recommends that insulin treatment begin with a long-acting form. In reality there is little difference in efficacy between long and intermediate-acting forms of insulin.[25] Long-acting forms of insulin, e.g. glargine, may be appropriate if hypoglycaemia is a concern.[5] Pre-mixed insulins may be considered for patients who are unable to meet HbA_{1c} targets with isophane and have elevated post-prandial blood glucose levels.[5] Biphasic insulin lispro and insulin aspart pre-mixes are preferred by some clinicians to biphasic isophane pre-mixes due to a reduced risk of hypoglycaemia. The transition from basal insulin to pre-mixed insulin can be managed in primary care, although discussion with a diabetologist or diabetes nurse is recommended for practitioners who are not experienced with the process.

Managing hypoglycaemia

Before insulin is initiated, ensure that patients know the symptoms of hypoglycaemia, e.g. shaking, sweating, blurred vision, light-headedness, loss of concentration. Hypoglycaemia usually begins when blood glucose is < 4 mmol/L.[26]

If symptoms occur, advise the patient to check their blood glucose level (if possible) to confirm that this is the cause of their symptoms. Patients with hypoglycaemia can be advised to:[26]

- Eat one serving of a quick-acting carbohydrate, e.g. seven to eight jellybeans or three teaspoons of glucose powder dissolved in water
- Check blood glucose level after ten minutes – if it is still < 4 mmol/L, eat another serving of quick-acting carbohydrate
- Once blood glucose level is > 4 mmol/L, eat a snack such as three or four crackers, or a small tub of low-fat yoghurt, or a meal if it is the appropriate time of day

If a patient has recurrent episodes of hypoglycaemia, despite lowering the dose, consider contacting a diabetologist or a diabetes nurse for further management advice.[5]

Titrating insulin dosing

The initial insulin dose is a starting point. The dose should be titrated until the agreed glycaemic level is reached or hypoglycaemia limits further increases.[5] Advise patients to maintain a regular intake of food during this process. Three consecutive blood glucose measurements are used to titrate insulin dosing, the timing of which depends on the regimen: once daily, at night – measure blood glucose pre-breakfast (fasting); once daily, before breakfast – measure blood glucose pre-evening meal; twice daily – measure blood glucose either pre-breakfast or pre-evening meal.[5]

Generally the patient's blood glucose levels are reviewed every two to four days, depending on their response. Ideally, patients will be able to self-adjust insulin doses and follow-up should be arranged to ensure that this is occurring.[5] Contact with the patient in the days immediately following insulin initiation is important to support treatment and improve outcomes. The frequency of self-monitoring of blood glucose can be reduced once the insulin regimen is established.

For further information, see: "Initiating insulin for people with type 2 diabetes", BPJ 42 (Feb, 2012).

Diabetes New Zealand provides patient information for managing hypoglycaemia, available from: **www.diabetes.org.nz/living_well_with_diabetes/living_with_type_1_diabetes/low_blood_glucose_hypo**

Managing risk factors with regular follow-up

People with type 2 diabetes are three times more likely to die of a cardiovascular event compared with the general population.[27] While good glycaemic control improves microvascular outcomes, it does not appear to improve cardiovascular outcomes to the same extent.[6] Therefore glycaemic control is part of a wider suite of interventions for patients with type 2 diabetes, including smoking cessation, blood pressure control, lipid management and, if appropriate, antiplatelet treatment.[12] A study found that in patients with type 2 diabetes and microalbuminuria the risk of cardiovascular and microvascular events was reduced by approximately one-half with an intensive management strategy focusing on multiple risk factors, compared to conventional care.[28]

The importance of treating hypertension

Between 70% and 80% of people with type 2 diabetes have hypertension.[6] People with diabetes are particularly susceptible to blood pressure-related complications; a systolic blood pressure > 120 mmHg in combination with diabetes predicts long-term end-stage kidney disease.[29] Controlling blood pressure in patients with diabetes decreases the risk of myocardial infarction, heart failure, stroke and all-cause-mortality, nephropathy and other microvascular complications.[6]

Recently the benefits of blood pressure control in patients with type 2 diabetes have been quantified. A meta-analysis including more than 100 000 people with type 2 diabetes and hypertension, found that each 10 mmHg drop in systolic blood pressure was associated with a significantly lower risk of mortality, cardiovascular events, coronary heart disease and stroke.[30] However, the optimal range when managing blood pressure in people with type 2 diabetes is narrow; systolic blood pressure < 120 mmHg is associated with an increased risk of hypotension, falls and cardiac dysrhythmias.[31]

Treating hypertension improves microvascular outcomes

Controlling hypertension in people with type 2 diabetes is associated with reduced diabetic retinopathy and albuminuria.[30] A Cochrane review found that reducing blood pressure had a protective effect against diabetic retinopathy that lasted for four to five years.[32] However, there was less evidence supporting the use of antihypertensives as a treatment for existing retinopathy.[32]

For further information, see: "Hypertension in adults: The silent killer", BPJ 54 (2013).

Angiotensin converting enzyme (ACE) inhibitors are first-line

Pharmacological treatment is recommended for all patients with type 2 diabetes with a blood pressure consistently > 130/80 mmHg for three months, despite changes in lifestyle.[5]

An ACE inhibitor is the preferred antihypertensive for patients with type 2 diabetes; an angiotensin II receptor blocker (ARB) is recommended if an ACE inhibitor is not tolerated.[5]

Annual reviews of kidney function

The albumin:creatinine ratio (ACR) of patients with type 2 diabetes should be measured at least annually and more frequently for Māori, Pacific and South Asian peoples.[5] Microalbuminuria is the earliest sign of chronic kidney disease (CKD) in people with diabetes and requires prompt treatment.[5]

Treat albuminuria to reduce cardiovascular risk

Preserving renal function is a crucial part of diabetes care. Blood

Living Well with Diabetes: a strategic plan from the Ministry of Health

In October, 2015, the Ministry of Health released its "Living Well with Diabetes" vision. The objective is to ensure that people with diabetes, or at risk of developing type 2 diabetes, are living well and have access to high-quality patient-centred heath services.[36]

The plan identifies six priority areas:[36]

1. To ensure health services are based on evidence and to test and evaluate interventions to find out what works best in New Zealand
2. Prevention and early intervention, including mental health needs, to reduce the burden of diabetes
3. Reducing disparities in health outcomes due to diabetes
4. Providing patient-centred health services
5. Providing sustainable and consistent health services across New Zealand
6. Achieving effective self-management of diabetes, including the provision of technology-enabled tools

Within the plan are measures created to track progress in improving health outcomes for people with diabetes against a two-year baseline from 2013 – 2014.

Further information is available from: **www.health.govt.nz/publication/living-well-diabetes**

pressure control is the cornerstone of treatment for people with reduced renal function. Management of cardiovascular risk factors needs to be intensive in patients with type 2 diabetes and microalbuminuria. The five-year cardiovascular risk of a patient with diabetes and an ACR ≥ 30 mg/mmol is assumed to be > 20%.[33]

For further information see: "The detection and management of patients with chronic kidney disease", BPJ 66 (Feb, 2015).

Managing cholesterol in patients with type 2 diabetes

People with type 2 diabetes often have elevated serum triglycerides, decreased HDL cholesterol levels and LDL cholesterol levels that vary from elevated to normal.[6] In patients with type 2 diabetes LDL particles may be more prone to plaque formation.[6]

Consider initiating a statin for patients with a five-year cardiovascular risk of >10%;[33] the benefits of statin treatment increase as the patient's cardiovascular risk increase.

Making foot checks a habit

Encourage patients with type 2 diabetes to inspect their feet regularly or ask a family member to do so. The patient's feet should be assessed at least once a year, or every three months if they are at high risk of foot complications.[5] Risk factors for foot disease in people with diabetes include:[5]

- Presence of callus
- Peripheral vascular disease
- Peripheral neuropathy
- Previous amputation
- Previous ulceration
- Joint deformity
- Visual/mobility problems

Retinopathy testing at least every two years

Patients with type 2 diabetes require retinal testing at least every two years.[5] Testing is performed more frequently if the patient has been diagnosed with retinopathy, depending on the severity.[5]

Assess mental health and wellbeing

Health professionals should be vigilant for mental health problems in patients with type 2 diabetes. Depression is reportedly twice as common, compared with people in the

general population and there is a bidirectional relationship between the conditions, i.e. type 2 diabetes increases the risk of depression and depression increases the risk of type 2 diabetes.[34] Patients may experience anxiety when they are diagnosed with diabetes or when complications occur.[34] Only one-third of patients with type 2 diabetes and a co-existing mental health disorder are reported to receive treatment for this.[34]

Poor mental health makes it more likely that patients will not adhere to treatment or attend consultations, increasing their risk of diabetes-related complications and reducing quality of life.[34]

Consider using a depression screening tool such as the Patient Health Questionnaire (PHQ)-2:[35]

"Over the last two weeks, how often have you been bothered by either of the following problems?":

- Little interest or pleasure in doing things
- Feeling down, depressed, or hopeless

Not at all = 0 points, several days = 1 point, more than half the days = 2 points, nearly every day = 3 points. A combined score ≥3 across the two questions indicates depression.[35]

The importance of assessing mental health and wellbeing is highlighted in the recent Living Well with Diabetes strategic plan from the Ministry of Health.

For further reading, see: "Improving glycaemic control in people with type 2 diabetes: Expanding the primary care toolbox", BPJ 53 (Jun, 2013).

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