



Diabetes:

A Multi-Disciplinary Approach

Diabetes is a systemic disease that affects multiple organs in the body, hence a multi-disciplinary approach is required to deliver holistic care to patients. We asked four specialists about their roles in caring for patients with diabetes, a complex yet common condition that affects an estimated 400,000 Singaporeans.

FIRST, SOME BACKGROUND

Since the day our Government declared 'war' on the disease in 2016, diabetes has become a household name for all the wrong reasons. However, not everyone understands how it works – or rather, disrupts the way a healthy body works.

In a nutshell, diabetes, also known as Diabetes Mellitus, has two forms – Type 1 and Type 2. In patients with Type 1 diabetes, the pancreas produces little or no insulin,

the hormone that regulates the amount of glucose or sugar in our blood. In Type 2 diabetes, the body develops a resistance to insulin and is unable to use it properly. Both types result in high blood sugar levels, also known as glucose levels, which can lead to multi-organ complications.

While the exact cause of Type 1 diabetes is unknown, it occurs when the body's immune system mistakenly destroys the cells involved in insulin production. Type 2

is often the result of poor diet and lack of exercise and is largely preventable.

IT TAKES A VILLAGE (OR A MEDICAL TEAM)

In complex or advanced cases of diabetes, the medical team can involve doctors across different disciplines such as a general practitioner, an endocrinologist, a cardiologist, a nephrologist and an ophthalmologist. Often, allied health workers like a dietitian and a podiatrist will



Dr Goh explained that while most cases of diabetes can be managed by a general practitioner, complex cases are often referred for management at the specialist level. These cases include gestational (pregnancy-related) diabetes, frequent hypoglycaemic episodes (abnormally low blood sugar levels), sub-optimal control, labile or brittle diabetes, and diabetic emergencies such as diabetic ketoacidosis (DKA), a life-threatening condition that occurs when the body breaks down fat and produces ketones, which cause blood to become acidic.

Types of treatment

Though diabetes is common, no two cases are identical. Hence treatment plans are always tailored to individual patients.

“There is no one-size-fits-all approach to diabetes treatment as each patient is different with a different genetic make-up, weight and lifestyle. The initial treatment will also depend on the severity of the diabetes,” said Dr Goh.

“In mild to moderate cases, the approach is to use agents to gradually lower blood sugar level. In more serious cases, when there is a risk of developing a diabetic emergency such as DKA, insulin may be required to rapidly lower blood sugar level,” he added.

New and improved

There are several different classes of oral agents that are used to treat diabetes, and new ones are constantly being developed by the pharmaceutical industry.

“There are new classes of oral medication known as SGLT2 inhibitors, which cause excess sugars to be excreted through the urine,” said Dr Goh.

Besides controlling glucose levels, this new medication has shown other beneficial effects such as helping to lower blood pressure and reduce weight. However, Dr Goh emphasised that, like all drugs, it may not be suitable for all patients, and stressed the need for individualised treatment.

“In the general population, diabetes is common, but among cardiology patients, it's staggering.”

The need for screening

Since a key aim of diabetes treatment is to prevent development of diabetic complications, Dr Goh advocates following international guidelines, which recommend regular annual screening. This is important so that complications can be detected in their early stages and effective preventive treatment can be started before they become irreversible or life-threatening.

Common complications of diabetes include major cardiovascular events like strokes and heart attacks, together with kidney failure, blindness and limb amputations.

That brings us to the role of... the cardiologist.

THE CARDIOLOGIST

We spoke to Dr Soon Chao Yang, Interventional Cardiologist at The Heart Doctors Clinic, about the role of a cardiologist in the treatment of diabetes.

“In the general population, diabetes is common, but among cardiology patients, it is staggering,” said Dr Soon. “Adults with diabetes are two to four times more likely to die from heart disease than adults

also contribute to the care of the diabetic. Given the importance of medication in managing and treating diabetes, a pharmacist also plays an important role.

At the risk of stating the obvious, the success of any treatment relies heavily on the cooperation of the patient.

THE ENDOCRINOLOGIST

We asked Dr Goh Kian Peng, an Endocrinologist at Saint-Julien Clinic for Diabetes & Endocrinology, about the role of an endocrinologist in the treatment of diabetes.

without diabetes,” shared Dr Soon. “At least 68 percent of people aged 65 or older with diabetes die from some form of heart disease, and 16 percent die of stroke.”

Hence cardiologists play a major role in the prevention, treatment and management of the cardiovascular complications of diabetes.

Why diabetes damages the heart

Basically, diabetic patients face a heightened risk of heart disease because high blood sugar levels are atherogenic, meaning that they lead to the build-up of unhealthy deposits in their blood vessels. In addition, patients with diabetes, particularly Type 2 diabetes, often have multiple cardiovascular risk factors such as high blood pressure, high bad cholesterol, obesity, lack of physical exercise and so on, that contribute to their risk for developing cardiovascular disease.

Not your regular coronary artery disease

Dr Soon shared that the most common presentation of diabetic heart disease is in the form of coronary artery disease (CAD). However, the treatment of diabetic CAD differs from the treatment of non-diabetic CAD due to some important differences in the pattern and presentation of the disease.

The main difference between diabetic and non-diabetic CAD is the excessive calcification in diabetic CAD, which leads to significant challenges in angioplasty (ballooning) treatment. Often, rotablation is required to remove calcified deposits. This procedure uses a tiny drill and is powered by compressed air. It is considered a riskier procedure than angioplasty.

CAD is generally more widespread in diabetic patients, who are also more likely to require major surgery (such as coronary artery bypass) due to multiple blocked blood vessels.

Furthermore, diabetic CAD patients tend to suffer from micro ischaemia – a coronary artery disease that blocks the minor arterial branches, which are impossible to treat with ballooning or surgery.

Diabetic CAD patients also face a higher risk of recurrence. Even after a successful coronary artery ballooning or bypass, diabetics have a higher chance of having blockages form in the future, which may in turn require more surgeries.

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Getting better all the time

In addition to new medications and more efficient glucose monitoring systems, Dr Soon highlighted that there are new medical devices that are improving the outcomes for patients with diabetic CAD.

In particular, new medication-coated or drug-eluting stents are significantly reducing the risk of recurrent CAD. These are miniature scaffold implants that are inserted directly into the arteries after an angioplasty.

That’s certainly heartening news for patients with diabetes-related heart problems. Now let’s move on to the kidneys...

THE NEPHROLOGIST

We caught up with Dr Stephen Chew Tec Huan, Senior Consultant Nephrologist from Stephen Chew Centre for Kidney Disease and Hypertension Pte Ltd, to learn about the role of a nephrologist in the treatment of diabetes.

“Patients with diabetes are more susceptible to bladder-related dysfunction and this causes a variety of issues related to smooth and complete emptying of the bladder,” explained Dr Chew. “The retained urine in the bladder from incomplete removal can present as issues of incontinence, or relapsing urinary tract infections.”

A fortunate ‘side effect’ of treating diabetes-related bladder and urinary tract problems is that the doctor can also detect the tell-tale signs of other diseases that are not directly caused by diabetes. Blood in the urine, declining kidney function and pain in the loin may prompt the doctor to conduct a more comprehensive urological assessment, which could uncover separate conditions such as tumours or kidney stones.

Why the kidneys are compromised

When we asked Dr Chew why the kidneys are often affected by diabetes, he explained that the reasons are many and varied.

“A chronic exposure to high levels of glucose causes an overfunction of the kidney and an undue increase in the flow pressure within the kidneys, which leads to progressive injury if unchecked,” shared Dr Chew.

According to Dr Chew, diabetes can also stimulate an adverse response in kidney tissue that can cause ongoing damage, and lead to an accumulation of abnormal glucose end-products in the kidneys and blood vessels throughout the body. These can persist long after glucose levels have been brought under control.

“The diabetic kidney is also at an increased risk of injury from hypertension and hyperlipidaemia. Though these conditions are common in the community and are able to cause renal injury on their own, in the diabetic they produce an amplified effect,” shared Dr Chew.



The treatment of kidney complications

Dr Chew shared that the standard of care is, first and foremost, effective diabetic control.

“Glucose control has to be initiated early and deferring treatment only serves to increase the risk of injury to the kidneys. But most importantly, the normalisation of glucose does not mean injury cannot continue to occur. The kidneys have a ‘long memory’ for injury!” cautioned Dr Chew.

In addition to glucose monitoring and control, rigorous blood pressure control is recommended. As kidney injury advances, the amount of medication required to keep the blood pressure under control tends to increase. Needless to say, medication works best with adequate dosing and a restricted salt intake.

After glucose and blood pressure control comes cholesterol control, which can be effectively achieved through many types of medication.

New drugs help with prevention and protection

There are several promising new drugs, including inhibitors, that not only control glucose levels but also serve to improve kidney function.

“This group of drugs also protects the kidneys through other mechanisms,” added Dr Chew. “It is the first glucose-reducing drug that directly protects the kidneys as well as other organs.”

Clearly, good glucose control benefits us in so many ways. Let us not forget our eyes as well.

THE OPHTHALMOLOGIST

Last but not least, we spoke to Dr Jacob Cheng Yen Chuan, Director, Retinal Services at Eagle Eye Centre, about how diabetes affects the eyes.

In short, the ravages of diabetes can lead to total vision loss, or blindness.

“Many diabetics are unaware of the pressing need for regular eye examinations. Early detection and timely treatment of diabetic retinopathy can slow the onset of ocular complications and reduce the risk of vision loss,” shared Dr Cheng.

Given that retinopathy initially displays no symptoms, it can lead to blindness, so the importance of annual eye examinations cannot be overstated.

“Patients with Type 1 diabetes should have annual screenings starting five years after the onset of the disease. Type 2 diabetics should be screened yearly upon diagnosis. As many as a third of them may already have retinopathy at the time of the initial diagnosis, as the exact date of onset is difficult to determine,” advised Dr Cheng.

The retina and the macula

Diabetic retinopathy occurs when blood vessels in the retina are damaged after glucose levels enter the unhealthy range.

According to Dr Cheng, approximately a quarter of all diabetics will have some form of retinopathy after five years. The risk more than doubles to six percent after 10 years for Type 1 diabetics, and can soar to 84 percent after 19 years for Type 2 diabetics.

Diabetic retinopathy is divided into two stages. The first and early stage, known as non-proliferative diabetic retinopathy, is the most common form. Damaged blood vessels leak blood, proteins and fluid, resulting in swelling of the retina. It progresses from mild to moderate and severe as more and more blood vessels become damaged. However, vision is usually not affected and treatment is not required.

The second and late stage, known as proliferative diabetic retinopathy, is a major cause of blindness in diabetics. 25 percent of Type 2 patients may have this form of retinopathy after 25 years. At this stage, new and abnormal fragile blood vessels are formed. They bleed easily and result in leakage of blood inside the eye, known as vitreous haemorrhage. Over time, the vessels scar and pull the retina off the eye. This detachment leads to blindness.

Diabetic retinopathy is treated with laser photocoagulation and vitrectomy. The earlier the treatment, the better the outcome.

There are two types of laser photocoagulation: focal laser coagulation and scatter laser photocoagulation. The first involves shining a laser beam on the retina to seal off abnormal blood vessels to stop leaking. In scatter laser



photocoagulation, also called pan retinal photocoagulation (PRP), burns are made on the whole retina. This prevents new vessels from growing and reduces the risk of blindness from vitreous haemorrhage or detachment of the retina. It only works before significant bleeding or detachment has occurred, and can also be used to treat some kinds of glaucoma.

When vitreous haemorrhage or detachment of the retina has occurred, vitrectomy is recommended. In this operation, fine surgical instruments are used to remove the blood or repair retinal detachment from inside the eye to avert blindness.

Another vision-related complication of diabetes is diabetic maculopathy. Diabetic maculopathy affects the central part of the retina known as the macula, which controls central vision and allows us to see fine details. This may be caused by compromised blood flow or swelling, known as diabetic macular edema (DME). DME is the most common cause of diabetic maculopathy and is potentially sight-threatening.

DME must be treated immediately. Fortunately, treatment is usually effective at stopping and sometimes even reversing vision loss.

Cataracts and glaucoma

In addition to diabetic retinopathy and maculopathy, diabetics also face a heightened risk of developing cataracts and glaucoma.

A cataract is a clouding of the eye's lens that results in the blurring of vision. Diabetics are nearly twice as likely to develop cataracts as the general population. They also tend to develop the disease at an earlier age and degenerate faster.

Cataracts are treated using phacoemulsification, where a tiny cut is made on the cornea for the insertion of a small device. The device emits ultrasound waves to break up the cloudy lenses, which are then removed and a new, artificial lens is inserted.

Diabetics are 40 percent more likely to suffer from glaucoma than non-diabetics and the risk increases with age. Glaucoma occurs when pressure builds up in the eye, compressing the retina and optic nerve blood vessels – leading to irreversible vision loss.

There are many treatment options for diabetic patients with glaucoma, ranging from eye drops to laser treatment such as laser trabeculoplasty to reduce the pressure in the eye. Trabeculectomy is a surgical option that creates an opening in the white of the eye to drain excess eye fluid.

The future looks hopeful

Dr Cheng shared good news about a new type of drug that controls the vascular endothelial growth factor (VEGF), which stimulates the formation of blood vessels that contribute to both diabetic retinopathy and DME.

The relatively new treatment involves injecting a drug containing VEGF inhibitors or intraocular steroids directly into the eye. These drugs can slow the growth of new blood vessels, reduce the leakage of fluid into the macula and prevent further bleeding. They have become the treatment of choice for DME and some forms of retinopathy.

IN CONCLUSION

When it comes to diabetes, it takes a whole team to treat the whole person. Often, simply controlling glucose levels will have a beneficial effect on many of the organs that are directly or indirectly affected by diabetes.

As all of our contributors concurred, the sooner the condition is diagnosed, the better the treatment outcome. The only thing that is better than early detection is prevention.

Let us leave you with the Ministry of Health's war cry on diabetes – prevent, screen and control! ▣

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