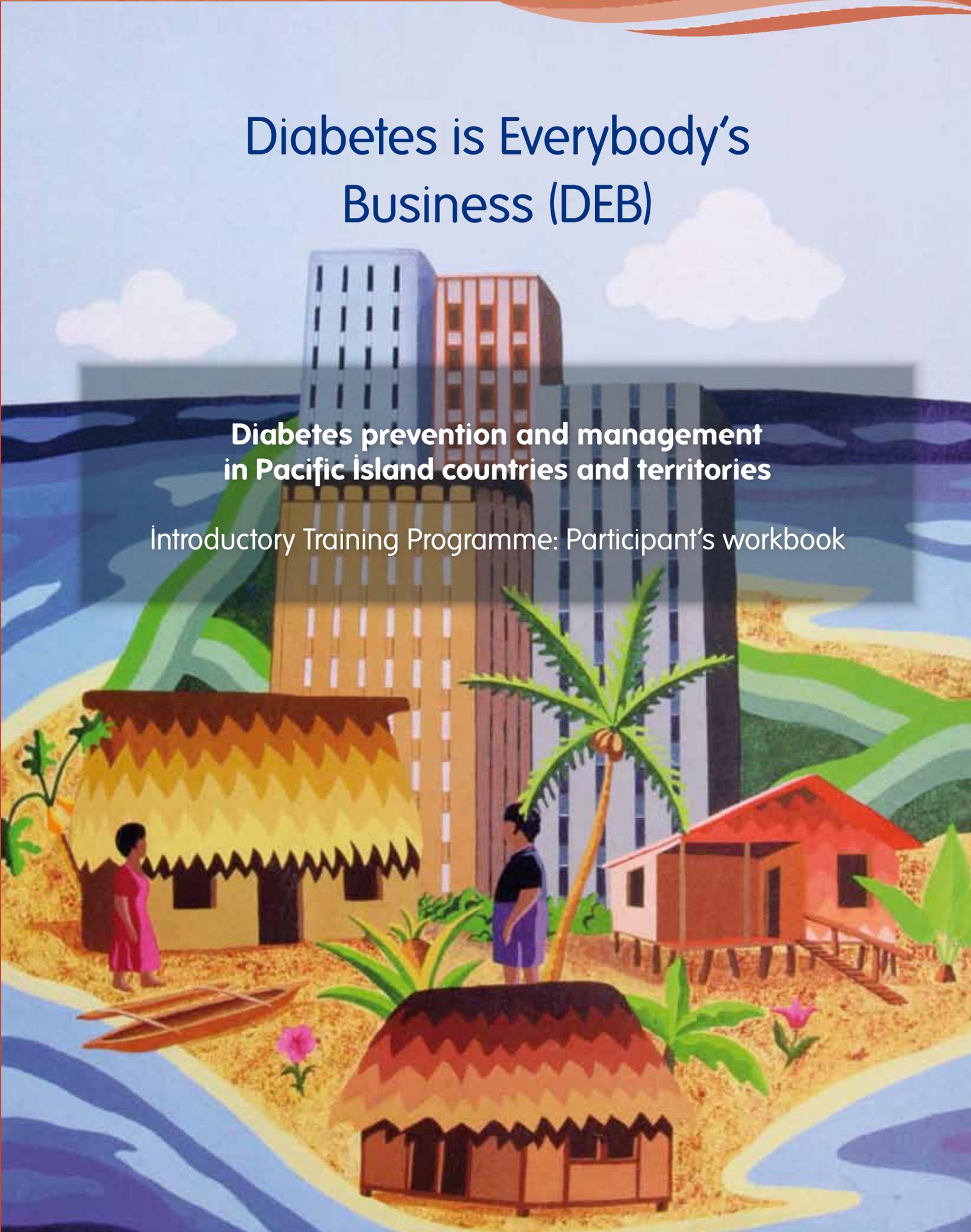


# Diabetes is Everybody's Business (DEB)

**Diabetes prevention and management  
in Pacific Island countries and territories**

Introductory Training Programme: Participant's workbook



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By  
Secretariat of the Pacific Community

Secretariat of the Pacific Community  
Noumea, New Caledonia, 2011



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Original text: English

Secretariat of the Pacific Community Cataloguing-in-publication data

Diabetes is Everybody's Business (DEB): diabetes prevention and management in Pacific Island countries and territories / by Secretariat of the Pacific Community

1. Diabetes – Prevention – Handbooks, manuals, etc.
2. Community health services – Oceania – Handbooks, manuals, etc.
3. Patient education – Oceania – Handbooks, manuals, etc.

I. Title II. Secretariat of the Pacific Community

362.196462

AACR2

ISBN: 978-982-00-0476-4

Design and layout: Muriel Borderie – SPC Publications Section

Prepared for publication at the Secretariat of the Pacific Community, Noumea, New Caledonia, 2011

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# Acknowledgments

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The following individuals are acknowledged and thanked for their contribution to this revised and updated publication:

Professor Bill Bellew – University of Sydney / University of Queensland

Diana O’Neill – Ministry of Health, New Zealand

Dr Viliami Puloka – Secretariat of the Pacific Community (SPC)

Dr Si Thu Win Tin – SPC

Greg Keeble – SPC

Jeanie McKenzie – SPC

Karen Nemaia-Fukofuka – SPC

Richard Thomson – SPC

An earlier draft for this publication was prepared by Ruth Colagiuri, Dorothy Thomas and Lydia Donley at the Australian Centre for Diabetes Strategies, Prince of Wales Hospital, Sydney, Australia. The document was revised and updated for SPC by Bill Bellew Consulting Associates in 2010.

***Suggested citation:***

Secretariat of the Pacific Community. (2011). *Diabetes is Everybody’s Business – Diabetes prevention and management in Pacific Island countries and territories. Introductory Training Programme: Participant’s Workbook*. Noumea, New Caledonia: SPC.

# About this workbook

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## *What is this workbook designed for?*

The purpose of this *Participant's Workbook* is to assist in improving the quality of community information and preventive guidance regarding diabetes, and of diabetic care and education provided by community health workers in Pacific Island countries and territories (PICTs).

The workbook contains virtually identical information to the manual used by facilitators running your course or workshop. It is a printed resource that you can use to:

- ▶ keep pace with the learning;
- ▶ revise the content covered; and
- ▶ use later to help you in your work with individuals, families and the community (you may have an electronic copy of the workbook on request from SPC).

The workbook presents a **basic training participant package** for community health workers, in preventing diabetes and providing simple education for people with diabetes.

Current clinical information is also provided, for example on the screening, control and treatment of diabetes. However **it should be noted that additional training would be required for community health workers who are expected to take on a specialised role in the diabetes area.**

Community health workers need to understand the recommendations for the administration and safe use of medications used for people with diabetes. **However these medications should be prescribed by a doctor or trained diabetes nurse only. The type and dosage of tablets should not be modified unless one of these health professionals directs it.**

Users are advised to check Appendix 5, which gives details on sources of additional information including recent evidence-based guidelines and online manuals for health professionals. The information in this workbook can also be tailored to train others. For example, it might be adapted to teach community workers how to raise diabetes awareness in the community.

## *What other learning materials are used with this workbook?*

The Diabetes is Everybody's Business (DEB) training materials consist of this Participant's Workbook and two additional supporting resources as follows:

- ▶ The **Facilitator's Manual** contains information for the facilitator who is training community health workers in diabetes prevention and care
- ▶ **PowerPoint Presentations** support both the facilitator and participant booklets. There is a set of PowerPoint presentations corresponding to each one of the eight learning modules focused on content in DEB.

## How do I use the Participant's Workbook?

### Presentation and learning materials

- ▶ There is a set of PowerPoint presentations corresponding to each one of the eight learning modules focused on content in DEB. Numbered PowerPoint slides are provided for each module/topic within DEB and additional resources are suggested where appropriate. (See table below.)
- ▶ Participants are encouraged to add to and adapt the presentation to suit the context and specific needs of the participants by including their own resources, illustrations, and teaching strategies and aids to enhance the learning.
- ▶ The Participant's Workbook is designed to be used by participants as part of their diabetes prevention and management training activities and in later practice.
- ▶ A list of supplementary information sources is included in Appendix 5.
- ▶ Visit the Healthy Pacific Lifestyle portal at the SPC website to access a wide range of a range of resources such as posters, leaflets, information booklets and videos for use in the Pacific: [http://www.spc.int/ac/Healthy\\_Lifestyle/resources\\_posters.html](http://www.spc.int/ac/Healthy_Lifestyle/resources_posters.html)

**Table 1: Overview of content-focused learning modules**

Learning Module	Title	PowerPoint Slide Numbers
Learning module 1:	What is diabetes?	01-33
Learning module 2:	Why is diabetes a problem?	34-49
Learning module 3:	Finding and helping people with diabetes	50-81
Learning module 4:	Monitoring and screening for complications	82-97
Learning module 5:	Patient and family education	98-189
	5.1 Dietary management	98-119
	5.2 Physical activity	120-138
	5.3 Healthy lifestyle	139-176
	5.4 Care of the feet	177-189
Learning module 6:	Treatment of diabetes — medical management	190-214
Learning module 7:	Stop the problem before it starts - prevention	215-233
Learning module 8:	What should your role be?	234-257



**PowerPoint Presentations** support both the facilitator and participant booklets. *There is a set of PowerPoint presentations corresponding to each one of the eight learning modules in DEB (there are 4 sub presentations in module 5 – making 11 PowerPoint presentations in total – see table.*

### *Principles of adult learning*

In keeping with adult learning principles and philosophy, the training programme is intended to be presented in an interactive style. Its training strategies are likely to include questioning techniques, demonstrations, role plays, case studies, and hands-on practice to involve participants directly and actively in the learning process. Refer to Appendix 1 for more on effective practices in adult learning; note also that case studies are set out in Appendix 2 and role plays in Appendix 3.

### *Suggested group size*

The ideal size for the workshops described in this workbook is 12 to 24 participants, who preferably share similar knowledge levels and experiences.

### *Running a healthy workshop*

If you are using this workbook to support workshops in the community it is important to try to run your workshop in a healthy manner. For example, if possible there should be:

- ▶ a smoke-free training room or environment;
- ▶ clean drinking water that is readily available;
- ▶ easy access to hand-washing facilities (so hands can be washed before snacks);
- ▶ regular breaks from sitting – even if it's just to stand up and stretch once every 60 minutes;
- ▶ no alcohol, kava, betel nut/areca nut provided or consumed during the working day;
- ▶ sugar-free drinks, fresh drinking coconut or other unsweetened fruit juices available; and
- ▶ healthy snacks or meals, with minimal added fat, sugar or salt (see below), and served in appropriate portions; suitable snacks include:
  - any type of fresh fruits;
  - chunks of carrot, cucumber, under-ripe papaya, and/or tomatoes;
  - slices of mature coconut;
  - sandwiches (wholemeal if possible) made with some salad and a small amount of lean meat, fish or cheese, no mayonnaise and not too much margarine;
  - wholemeal bread or toast with peanut butter;
  - cold pieces of taro (which can be topped with a piece of fish or meat or a slice of tomato);
  - cold pieces of taro, cooked sweet potato or cooking banana.

# Background information

Diabetes is the most common and rapidly increasing noncommunicable disease (NCD) worldwide. This disease creates an enormous personal and public health burden. Governments around the world are struggling to deliver adequate health care and preventive services to their populations.

## Diabetes in Pacific Island countries and territories

- ▶ Diabetes was relatively unknown in the Pacific Islands while our communities were still following traditional lifestyles. In most communities nowadays, however, everyone is affected by diabetes. It may be because they have diabetes themselves, or have a family member, loved one or close friend with diabetes, or simply because they are an employer, health worker, community member and/or taxpayer.
- ▶ Due to the major changes to traditional lifestyles and dietary habits over the last few decades in our region, the prevalence of diabetes is increasing at an alarming rate. In the Pacific Islands the growing epidemic of diabetes and cardiovascular disease presents a huge health and financial burden. The estimated prevalence of diabetes ranges from 22.6 to 47.3 per cent in the island countries shown in Table 2.

**Table 2: Estimated prevalence of diabetes\* in selected Pacific Island countries and territories**

Country/territory (year of data)	Prevalence rate
American Samoa (2004)	47.3%
Fiji Islands (2002)	22.6%
FSM Pohnpei (2002)	32.1%
Kiribati (2006)	28.1%
Marshall Islands (2002)	41.0%
Nauru (2004)	22.7%
Tokelau (2006)	43.6%

Source: STEPS, WHO Office for the South Pacific

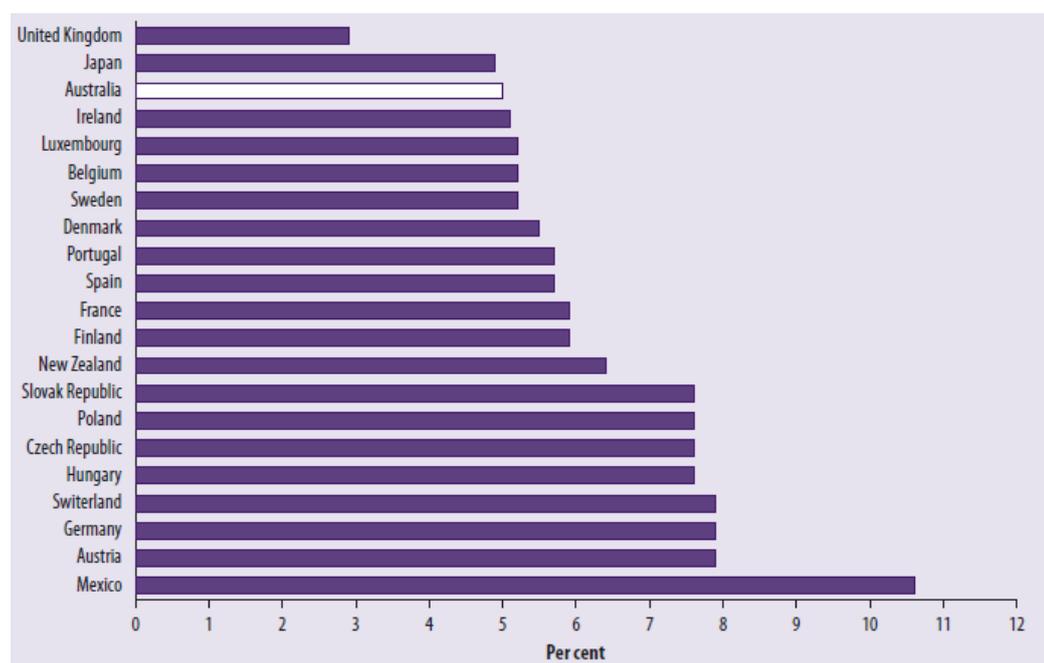
Note:

- \* Includes type 1 and type 2 diabetes (by far the most prevalent form) to assess the diabetes status of the surveyed population, the total diabetes prevalence was calculated and was defined as including the following two groups of participants:
- known or previously diagnosed diabetes if they were currently receiving anti-diabetes medication and/or insulin prescribed by a health worker; or
  - having fasting blood glucose greater than or equal to 110 mg/dl (6.1 mmol/L) without having known diabetes or being on treatment. These were called 'newly diagnosed diabetics'.

## International comparisons

Figure 1 compares the percentage of people with diabetes in 20 other countries. The highest rate (more than 10 per cent) was found in Mexico, while the lowest rate (around 3 per cent) was in the United Kingdom. Australia, with a prevalence rate of 5 per cent, is towards the bottom of this group of countries. These estimates of the prevalence for people aged 20 to 79 years have been adjusted for differences in the age structure of the populations. Note that the lowest prevalence for Pacific Island countries and territories shown in Table 2 (22.6 per cent in Fiji Islands) is about double the prevalence reported for Mexico. Table 3 compares the prevalence in selected PICTs with Australian and the United Kingdom in particular.

**Figure 1: Estimated prevalence of diabetes, selected countries 2007**



Source: International Diabetes Federation 2006, cited in AIHW 2007[1]

Note: Data are for 20- to 79-year-olds.

**Table 3: Estimated prevalence of diabetes in selected PICTs (2002-2006), United Kingdom and Australia (2007)**

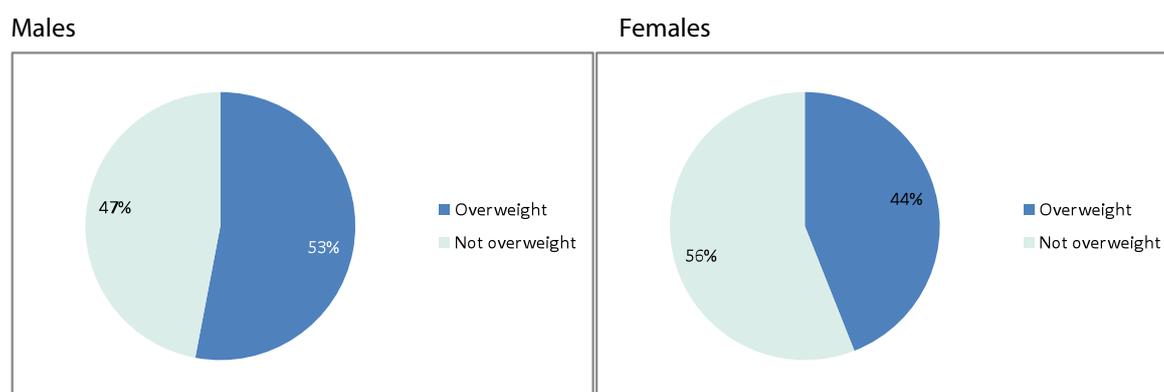
Country/territory (year of data)	Estimated prevalence of diabetes
United Kingdom (2007)	3.0%
Australia (2007)	5.0%
Fiji (2002)	22.6%
Kiribati (2006)	28.1%
FSM (Pohnpei) (2002)	32.1%
Marshall Islands (2002)	41.0%
Tokelau (2006)	43.6%
American Samoa (2004)	47.3%

Source: Data for UK and Australia (ages 20–79 years): International Diabetes Federation 2006, cited in AIHW 2007. Data for PICTs: STEPS (ages 25–64 years) (WHO and SPC)

### Prevention and delay of type 2 diabetes

- ▶ Type 2 diabetes is largely preventable. Control of modifiable risk factors, such as overweight and obesity and physical inactivity, is central to preventing type 2 diabetes and can help reduce the complications associated with it. However, the prevalence of a key risk factor, overweight and obesity, is increasing (refer to Figure 2).

**Figure 2: Projected prevalence of overweight for 2015, WHO Region for the Western Pacific, males and females aged 30 years or older**



Source: WHO, *The impact of chronic disease in the Western Pacific* [http://www.who.int/chp/chronic\\_disease\\_report/media/wpro.pdf](http://www.who.int/chp/chronic_disease_report/media/wpro.pdf)

- ▶ There is very good evidence for the interventions to prevent and delay type 2 diabetes. Randomised controlled trials have shown that individuals at high risk of developing diabetes – those with impaired fasting glucose (IFG), impaired glucose tolerance (IGT), or both – can be given interventions that significantly decrease the rate of onset of diabetes.[29]
- ▶ These interventions include intensive lifestyle modification programmes that have been shown to be very effective (58 per cent reduction after 3 years) and use of drugs such as Metformin, which has been shown to decrease the incidence of diabetes.
- ▶ Two important studies of lifestyle intervention have shown persistent reduction in the role of conversion to type 2 diabetes 3 years[10] and 14 years[11] after the intervention.
- ▶ The risk factors for developing type 2 diabetes are shown in Table 1 and include:
  - family history
  - obesity
  - physical inactivity
  - poor diet.

**Table 4: Risk factors for type 2 diabetes**

Demographic	Genetic	Lifestyle and behavioural	Biomedical/metabolic
Age	Ethnicity	Diet	Intra-uterine growth retardation
Urbanisation	Family history	Obesity (especially abdominal)	Previous gestational diabetes
	Specific genes have been identified	Physical inactivity Foetal nutrition	Impaired sugar regulation (i.e. impaired fasting sugar, impaired sugar tolerance)

Source: AIHW[1]

- ▶ Unfortunately Pacific Islanders appear to be at an increased genetic risk of developing diabetes. This factor, combined with the growth in unhealthy lifestyles and the increasingly high rates of obesity, is causing the escalating rates of diabetes. Given this increased risk amongst Pacific Islanders, lifestyle is all the more important as a tool for the prevention of diabetes.
- ▶ With the number of people with diabetes increasing rapidly, strong action is required to prevent any further increases and to reduce the personal suffering and huge financial and social burden on the community that currently results from diabetes. The essential strategy for achieving these outcomes is prevention. That is, the strategy must involve:
  - preventing diabetes from developing in people who do not have diabetes; and
  - preventing complications in people who already have diabetes.

In other words, *Diabetes is Everybody's Business*. It is up to everyone at all levels of government, the health system and the community to join in the fight against diabetes in the Pacific community.

### *Management of diabetes*

- ▶ The long-term effects of undiagnosed or poorly controlled diabetes can include blindness, kidney failure, neuropathy, amputation, stroke, heart attack, erectile dysfunction and a shorter life expectancy. The rates of lower limb amputation, kidney failure and other diabetes complications are considerably higher in the Pacific region than in highly industrialised countries. Such complications add to the already huge health and social consequences of diabetes in the region.
- ▶ Early detection and good management of diabetes can reduce the risk of long-term complications, which have a major impact on the lifestyle of the individual and family members. With good management and control, a person with diabetes can reduce the risk of developing any of these problems and live a full life.
- ▶ To achieve good control, the person with diabetes must be committed to their own care. Equally, every person with diabetes requires support and encouragement from health professionals, their family and the community.
- ▶ Actions needed to achieve good diabetes control include:
  - maintaining good body weight – and losing weight if overweight;
  - being physically active regularly;
  - having a healthy, balanced diet with regular meals, and low sugar intake;
  - having regular monitoring of blood glucose, eye and foot health; and
  - taking insulin or oral hypoglycaemic agents (OHA, tablets for diabetes) if prescribed.

*NCD risk factors in Pacific Island countries and territories[12]*

- ▶ The Pacific Island region has outpaced the world in death rates from noncommunicable diseases. Globally, it is estimated that NCDs will cause 70 per cent of the disease burden by 2020. In the Pacific today, NCDs already cause 75 per cent of deaths, and indications are that NCD-related mortality and morbidity are rising.
- ▶ Common risk factors underlie NCDs. Especially significant risk factors are tobacco use, poor nutrition, excessive alcohol consumption and physical inactivity. Globalisation and urbanisation bring with them unhealthy lifestyles and environmental changes that can make communities more susceptible to these risk factors.
- ▶ These underlying risk factors give rise to intermediate risk factors such as high blood pressure, elevated blood glucose, abnormal lipid profiles and obesity.
- ▶ In turn, the intermediate risk factors predispose individuals to the ‘fatal four’ – cardiovascular diseases, cancer, chronic respiratory diseases and diabetes.
- ▶ The prevalence of NCD risk factors in selected PICTs is shown in Table 5.

**Table 5: Estimated prevalence of NCD risk factors in selected PICTs**

Risk Factor	Adult Prevalence (% among those aged 25-64 years)						
	Fiji	American Samoa	Marshall Islands	Samoa	Tokelau	Nauru	Cook Islands
Overweight	33.1	18.9	35.3	30.4	18.9	18.4	27.1
Obese	29.6	74.6	44.8	54.8	74.7	74.9	61.4
Daily tobacco use	15.8	29.9	20.8	34.6	46.9	49.5	33.3
Binge drinking	Males: 30.0 Females: 13.5	Males: 49.6 Females: 33.9	Males: 40.7 Females: 32.8	Males: 44.7 Females: 15.6	Males: 44.1 Females: 24.5	Males: 31.0 Females: 19.3	Males: 74.0 Females: 51.4
<5 servings of fruits and vegetables per day	--	86.7	91.1	43.3	91.6	97.0	84.7
Low physical Activity (<600 METminutes per week)	--	62.2	50.0	50.3	43.4	52.3	73.9
Elevated BP	27.0	34.2	15.9	21.1	18.1	24.3	29.5
Elevated total cholesterol	46.5	23.4	29.2	13.7	38.8	17.9	24.7
Elevated blood glucose	22.6	47.3	41.0	21.5	43.6	22.7	23.7

Source: STEPS, WHO Office for the South Pacific

Note:

MET = ‘MET’ or the standard metabolic equivalent is a unit used to estimate the amount of oxygen used by the body during physical activity. [1 MET = the energy used by the body at rest, while sitting quietly or reading. Since MET is a measure of intensity and rate, the concept of MET-minute can be used to quantify the total amount of physical activity in a way comparable across different persons and types of activities]. ;

BP = blood pressure

### *Working together to prevent and control NCDs*

Pacific Island countries and territories, the Secretariat of the Pacific Community (SPC) and the World Health Organization (WHO) have joined forces to combat noncommunicable diseases in the region. Together they have developed the Pacific Framework for the Prevention and Control of NCDs which provides a combined 2-1-22 approach (2 organisations, 1 team, serving 22 countries and territories).[12] The main objectives of the programme are to:

- ▶ strengthen development of multisectoral national NCD strategies;
- ▶ support countries and territories to implement their NCD strategies;
- ▶ develop sustainable funding mechanisms to deliver the strategies;
- ▶ strengthen national health systems and capacity to address and prevent NCDs; and
- ▶ strengthen monitoring and evaluation and surveillance systems for the region and individual PICTs.

WHO and SPC are using the WHO **stepwise framework** to help create policy, economic, socio-cultural and physical environments in PICTs that are conducive to NCD prevention and control:

- ▶ The **stepwise framework** includes three main planning steps and three main implementation steps (Figure 3). The three policy implementation steps are based on the level of resource available in countries:
  - core (implementation based on existing resources);
  - expanded (a realistic increase over and above existing resources); and
  - desirable (an increase that goes beyond the reach of existing resources).
- ▶ The first planning step is to assess the current risk factor profile of the population and to advocate for action. The second planning step is to formulate and adopt chronic disease policy. The third planning step is to identify the most effective means of implementing this policy. The particular combination of interventions is chosen to put policy into practice with maximum effect. The types of intervention to choose from are:
  - health financing
  - legislation and regulation
  - improving the built environment
  - advocacy initiatives
  - community mobilisation
  - health services organisation and delivery
- ▶ The framework is designed so that **the core implementation level is the foundation** on which expanded and desirable levels of implementation can be built.

Figure 3: The WHO stepwise planning framework



*The stepwise planning framework and DEB*

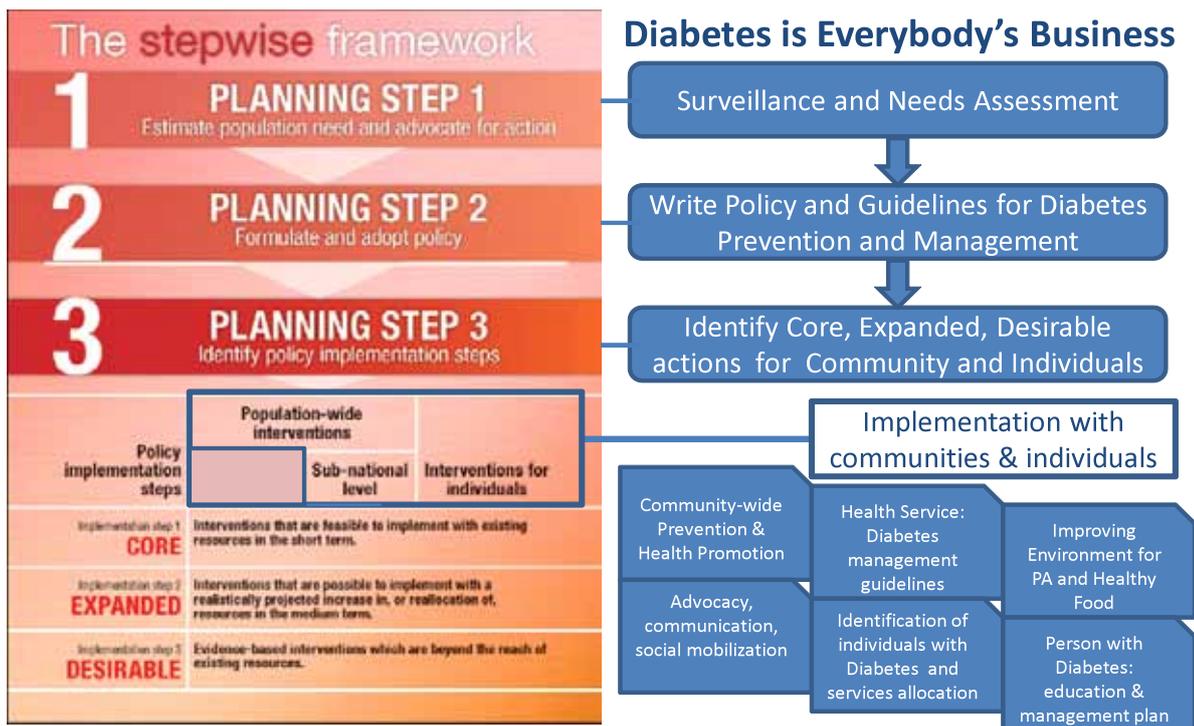
Figure 4 shows how the stepwise framework might be linked with diabetes prevention and management initiatives such as Diabetes is Everybody’s Business.

The implementation actions suggested in the model for diabetes prevention and management at community and individual level are:

- ▶ undertaking community-wide prevention and health promotion;
- ▶ undertaking advocacy, communication and social mobilisation;
- ▶ improving the environment for physical activity and healthy food;
- ▶ developing diabetes management guidelines for health services;
- ▶ identifying individuals with diabetes and allocating appropriate health-care services; and
- ▶ implementing education and management plans for individuals with diabetes.

**Figure 4: An application of the WHO stepwise planning framework for DEB – diabetes prevention and management, at the community and individual levels**

## The stepwise framework and DEB



## Suggested three-day programme and timetable

### Day 1

Time	Activities / learning modules	PowerPoint slides
8:30 a.m.	Registration	
9:00 a.m.	Welcome and introductions	01–33
9:30 a.m.	<b>Learning module 1: What is diabetes?</b> ▶ Topic 1.1: Understanding diabetes	
10:00 a.m.	<i>Break</i>	
10:30 a.m.	What is diabetes? ( <i>continued</i> ) ▶ Topic 1.2: Types of diabetes	
11:30 a.m.	<b>Learning module 2: Why is diabetes a problem?</b> ▶ Topic 2.1: Complications of diabetes ▶ Topic 2.2: Preventing or minimising complications	34–49
12:15 p.m.	<i>Lunch break</i>	
1:15 p.m.	<b>Learning module 3: Finding and helping people with diabetes</b> ▶ Topic 3.1: Identifying people with diabetes ▶ Topic 3.2: Early diagnosis and referral	50–81
2:45 p.m.	<i>Break</i>	
3:15 p.m.	<b>Learning module 4: Monitoring and screening for complications</b> ▶ Topic 4.1: Monitoring blood glucose levels ▶ Topic 4.2: Screening for complications	82–97
4:15 p.m.	Summary of the day and concluding remarks	
4:30 p.m.	<i>Finish</i>	

### Day 2

Time	Activities / learning modules	PowerPoint slides
8:30 a.m.	<b>Learning module 5: Patient and family education</b> ▶ Topic 5.1: Dietary management ▶ Topic 5.2: Physical activity ▶ Topic 5.3: Healthy lifestyle ▶ Topic 5.4: Care of the feet	98–189 98–119 120–138 139–176 177–189
11:00 a.m.	<i>Break</i>	
11:15 a.m.	<b>Learning module 6: Treatment of diabetes – medical management</b> ▶ Topic 6.1: Tablets and insulin ▶ Topic 6.2: Hypoglycaemia	190–214
12:45 p.m.	<i>Lunch</i>	
1:45 p.m.	<b>Learning module 7: Stop the problem before it starts – prevention</b>	215–238
2:45 p.m.	<i>Break</i>	
3:15 p.m.	Stop the problem before it starts – prevention ( <i>continued</i> )	
4.15	<b>Homework task (PowerPoint slide 252) 'My Diabetes Resource Book'</b> Develop your own resource from the Participant's Workbook	252
4:25 p.m.	Summary of the day and concluding remarks	
4:30 p.m.	<i>Finish</i>	

Day 3

Time	Activities / learning modules	PowerPoint slides
8:30 a.m.	<b>Learning module 8: What should your role be?</b> ▶ Topic 8.1 Community and patient education	234–253
9:15 a.m.	What should your role be? ( <i>continued</i> ) ▶ Topic 8.2 Supportive environments, supportive people	254–257
10:15 a.m.	<i>Break</i>	
10:45 a.m.	Summary so far and questions	
11:15 a.m.	<b>'My Diabetes Resource Book'</b> developing your own resource from the Participant's Workbook – homework (PowerPoint slide 252)	252
12:30 p.m.	<i>Lunch</i>	
1:30 p.m.	<b>Learning module 9: Mock sessions</b>	
3:00 p.m.	<i>Break</i>	
3:30 p.m.	Evaluation	
4:00 p.m.	Summary of the day/course and concluding remarks	
4:30 p.m.	<i>Finish</i>	

# Learning module 1: What is diabetes?

---

This learning module covers:

- ▶ Topic 1.1: Understanding diabetes
  - Introduction to blood glucose and insulin
- ▶ Topic 1.2: Types of diabetes
  - Aims of the management of diabetes

## Learning objectives

After this module, participants will have a basic understanding of normal blood glucose (sugar) and carbohydrate metabolism and the pathophysiology of diabetes. They will be able to:

1. define diabetes;
2. discuss normal carbohydrate metabolism versus carbohydrate metabolism in diabetes;
3. describe the functions of insulin;
4. identify the symptoms of the three major types of diabetes;
5. identify the differences among the three major types of diabetes;
6. list the risk factors for development of type 2 diabetes;
7. distinguish between modifiable and non-modifiable risk factors;
8. describe the aims and key principles of diabetes management; and
9. propose some possible reasons for the rapid increase in diabetes prevalence in Pacific Island countries and territories.

For approximate session timing, refer to the suggested timetable on page 12.

## Resources

- ▶ Refer to Table 1 for more information on PowerPoint presentations that support each module – page 2

## Key points: What is diabetes?

### 1.1 Understanding diabetes

Diabetes is a complex disorder that can impact heavily on those who have it. The person with diabetes requires a high level of knowledge and skills to manage their own treatment and care. A diagnosis of diabetes is often associated with feelings of guilt or denial and many people misunderstand the causes, treatment and/or effects of diabetes.

To give appropriate and accurate information and reassurance to the community and people with diabetes, it is essential for community health workers to understand the causes, features and effects of diabetes, how it is prevented and treated, and the implications of all these factors for the individual's daily life.

#### Diabetes

Diabetes is a long-term disorder with a raised level of sugar in the blood. When you have diabetes, your body cannot use carbohydrate (sugar or starch) properly because the insulin produced by body does not work properly, or because the body does not produce enough insulin. Sugars and starch come from carbohydrate foods like bread, potatoes, cereals, fruits and biscuits. These are the main foods used for energy.

In summary, diabetes:

- ▶ is a problem with the way that the body uses glucose (sugar) due to a lack of insulin or insulin not working properly;
- ▶ causes high glucose levels in the blood; and
- ▶ is a lifelong chronic disorder that cannot be cured but can be controlled.

#### Insulin

- ▶ Insulin is a hormone that is made by the pancreas (a body organ near your stomach). Insulin is needed to control the level of sugar in the blood (blood glucose level).
- ▶ Insulin acts as a key that opens the cell door.
- ▶ Insulin allows the sugar to pass from the blood stream into the body's cells so that the body cells can store the sugar and use it for energy.
- ▶ In diabetes, too much sugar stays in the blood and doesn't get into body cells.

In summary, insulin:

- ▶ is a hormone produced in the pancreas; and
- ▶ lowers blood glucose levels by:
  - moving glucose from the blood stream into the cells;
  - controlling glucose production by the liver.

In people with diabetes:

- ▶ there is not enough insulin; and/or
- ▶ the insulin does not work properly.

## Glucose

Glucose:

- ▶ is a type of sugar found in the blood;
- ▶ is used as a fuel by the body (like a car uses petrol/gas); and
- ▶ comes from (for humans):
  - carbohydrate foods (starchy and sugary);
  - the liver, which produces glucose when there is no other supply of carbohydrate available.

The normal blood glucose level is 4–7.7 millimoles per litre (mmol/L). In non-diabetics the level does not vary outside this range (see Table 11).

### 1.2 Types of diabetes

There are three main type of diabetes:

1. **Type 1 diabetes** is rare and found mainly in young children. This type will not be discussed in detail in this workbook.
2. **Type 2 diabetes** is the most common type (particularly in the Pacific Island region). It is the type of diabetes that this workbook and training will mostly focus on.
3. **Gestational diabetes** is found in some pregnant women during their pregnancy only; its causes and effects are similar to those for type 2 diabetes. Gestational diabetes may disappear after pregnancy, but signals a high risk of diabetes occurring later in life.

Diabetes can also be due to other **miscellaneous causes** accounting for a small proportion of cases. The causes include: genetic defects affecting beta-cell function, insulin action and mitochondrial DNA (e.g. maturity-onset diabetes of youth); pancreatic diseases (e.g. cystic fibrosis, pancreatitis, hemochromatosis); endocrinopathies (e.g. Cushing's syndrome, acromegaly); toxins (e.g. the rodenticide pyriminyl [Vacor]); and drug-induced diabetes, most notably from glucocorticoids, beta-blockers, protease inhibitors, and therapeutic doses of niacin but also from drug- or chemical-induced diabetes such as in the treatment of AIDS or after organ transplantation. These types of diabetes are not discussed in detail in this workbook.

Pregnancy causes some insulin resistance in all women, but only a few develop gestational diabetes (see below).

#### Type 1 diabetes

- ▶ Type 1 diabetes is rare in people from the Pacific Islands.
- ▶ It used to be called insulin dependent diabetes (IDDM).
- ▶ No modifiable risk factors have been clearly identified.
- ▶ Type 1 diabetes usually occurs in children, adolescents and young adults.
- ▶ It is thought that a combination of genetic and environmental factors are involved in the development of the disease.
- ▶ Onset has been linked to several viruses (including coxsackievirus, rubella, cytomegalovirus, Epstein-Barr, and retroviruses).
- ▶ Increased risk has been linked to exposure in infancy to dairy products (especially cow's milk and the milk protein beta casein), high nitrates in drinking water, and low vitamin D consumption (mechanisms unclear).
- ▶ Type 1 diabetes develops when the body's own defence (immune) system destroys the cells of the pancreas that produce insulin.
- ▶ It requires the person with diabetes to have insulin injections for life.

- ▶ It cannot be prevented or cured.
- ▶ It can be controlled with insulin injections, diet and physical activity.

### Type 2 diabetes

Type 2 diabetes:

- ▶ used to be called non-insulin dependent diabetes (NIDDM);
- ▶ is largely preventable through modifiable risk factors, such as overweight and obesity and physical inactivity;
- ▶ is driven by a key risk factor, overweight and obesity, which is increasing in many countries;
- ▶ is very common in the Pacific Islands, accounting for over 95 per cent of all diabetes cases;
- ▶ develops when there is not enough insulin in the body and/or the insulin is not working properly;
- ▶ has been found mainly in adults, but is now also being seen in children; and
- ▶ cannot be cured but can be controlled.

The **management** of type 2 diabetes involves:

- ▶ modifying lifestyle — mainly having an appropriate diet and undertaking physical activity; and
- ▶ in some cases, taking tablets or insulin as well.

**Risk factors** for developing type 2 diabetes are:

- ▶ increasing age – Pacific Islanders over 30 years of age are at greater risk (which is younger than the at-risk age for non Pacific Islanders);
- ▶ obesity or overweight;
- ▶ family history of diabetes;
- ▶ low levels of physical activity;
- ▶ for women, having a history of gestational diabetes; and
- ▶ impaired sugar regulation (i.e. impaired fasting sugar, impaired sugar tolerance).

### How many people are affected by type 2 diabetes?

- ▶ Diabetes was relatively unknown in Pacific Island peoples when they followed traditional lifestyles.
- ▶ Many people are affected by diabetes but are unaware of it; they are undiagnosed diabetics.
- ▶ The incidence of type 2 diabetes is now very high in many of the Pacific Islands. For example, the proportion of the adult population it affects in selected PICTs is estimated as follows:<sup>1</sup>
  - American Samoa (2004) 44.9 per cent
  - Fiji Islands (2002) 21.5 per cent
  - FSM (Pohnpei) (2002) 30.5 per cent
  - Kiribati (2006) 26.7 per cent
  - Marshall Islands (2002) 39.0 per cent
  - Nauru (2004) 21.6 per cent
  - Tokelau (2006) 41.4 per cent

1. Estimates are based on 95 per cent of the values for STEPS data shown in Table 1.

By way of comparison, about 5 per cent of Australians are affected by type 2 diabetes[1] (see Figure 1).

### Symptoms of undiagnosed or poorly controlled type 2 diabetes are:

- ▶ frequent urination
- ▶ lack of energy/tiredness
- ▶ weight loss
- ▶ excessive thirst
- ▶ blurred vision
- ▶ skin infections and slow healing of wounds
- ▶ itchiness

Alternatively, there may be no symptoms, or symptoms may develop gradually and go unnoticed for years.

### Gestational diabetes mellitus (GDM)

GDM:

- ▶ is a 'temporary' form of diabetes that may develop during pregnancy;
- ▶ is usually symptom free and is diagnosed with an oral glucose tolerance test (OGTT) performed between the 24th and 28th week of gestation;
- ▶ can only be detected by testing during pregnancy;
- ▶ in most cases, goes away as soon as the baby is born;
- ▶ is caused by the pancreas not producing the extra insulin needed to meet the increased demands in pregnancy;
- ▶ may cause more problems during pregnancy (increased risk of miscarriage, premature delivery, stillbirths, hypoglycaemia, delivery problems, excess water retention and other problems);
- ▶ puts the mother at high risk of developing type 2 diabetes later in life (40–60 per cent risk), and of developing gestational diabetes in other pregnancies; and
- ▶ increases the risk that the baby will be overweight or develop diabetes and other health problems later in life.

Expert opinion now states that high-risk women found to have diabetes at their initial prenatal visit using standard criteria receive a diagnosis of overt, not gestational, diabetes.

**Risk factors** for the development of GDM are:

- ▶ being an older mother (risk increases with age);
- ▶ having a history of sugar intolerance or gestational diabetes;
- ▶ being from certain high-risk ethnic groups, such as Indigenous Australians, and people from the Indian subcontinent, the Pacific Islands, Asia and the Middle East;
- ▶ having a family history of diabetes;
- ▶ having a history of 'large for gestational age' babies; and
- ▶ being overweight or obese before the pregnancy.

Gestational diabetes may occur in women who have no identifiable risk factors, which is why some organisations such as the Australasian Diabetes in Pregnancy Society (ADIPS) recommend screening for all women.

The **management** of gestational diabetes, while essentially the same as that for type 2 diabetes, requires:

- ▶ much stricter control than in the management of type 2 diabetes;
- ▶ regular medical and obstetric review; and
- ▶ monitoring of the mother's blood glucose levels during delivery.

**After delivery** gestational diabetes usually goes away (this can take up to 6 weeks). In terms of management:

- ▶ repeat the blood glucose test six weeks after delivery then review the mother's diabetes status annually (due to the increased risk of later development of diabetes);
- ▶ educate the mother and family on the importance of a lifelong healthy lifestyle for the mother and child; and
- ▶ it is very important that the mother maintains a healthy weight, healthy diet and regular physical activity.

Table 6 summarises the above information on the three types of diabetes.

**Table 6: Summary of the characteristics and treatment of each type of diabetes**

Characteristic / treatment	Type 2	Gestational	Type 1
Age of onset	<ul style="list-style-type: none"> <li>▶ Older, risk increases with age</li> <li>▶ However now occurs in younger people, even children</li> </ul>	Women of child-bearing age	Children to young adults
Body weight	Usually overweight	Variable	Normal weight or underweight
Treatment	<ul style="list-style-type: none"> <li>▶ Healthier lifestyle</li> <li>▶ Weight loss if overweight</li> <li>▶ Tablets or insulin for some people</li> </ul>		<ul style="list-style-type: none"> <li>▶ Diet and lifestyle</li> <li>▶ Insulin essential</li> </ul>
Symptoms	Gradual onset (may be symptom free)	Gradual onset (usually symptom free)	Acute
Risk factors	<ul style="list-style-type: none"> <li>▶ Age</li> <li>▶ Family history</li> <li>▶ Previous gestational diabetes</li> <li>▶ Overweight</li> <li>▶ Poor lifestyle</li> <li>▶ Impaired sugar regulation (i.e. impaired fasting sugar, impaired sugar tolerance)</li> </ul>		Unknown
Incidence in region?	Very high	Data lacking, but GDM certainly does occur	Rare

## *Learning module 2: Why is diabetes a problem?*

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This learning module covers:

- ▶ Topic 2.1: Complications of diabetes
- ▶ Topic 2.2: Preventing or minimising complications

### *Learning objectives*

After this session, participants will have a basic understanding of the long-term complications of diabetes. They will be able to:

1. identify the main complications of diabetes;
2. describe scenarios and risk factors for the likely development of these long-term complications;
3. outline clinical strategies for delaying, preventing or minimising long-term complications; and
4. outline lifestyle interventions for delaying, preventing or minimising long-term complications.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Case study 2 (Appendix 2)

## Key points: Why is diabetes a problem?

Diabetes is serious. Whether it is managed by diet and activity alone, or in combination with tablets or insulin, the degree of control achieved has significant consequences:

- ▶ Good diabetes control can prevent or minimise diabetes complications and prolong a healthy life.
- ▶ Poor diabetes control increases the likelihood that the individual will develop complications. Long-term complications of diabetes are a major cause of chronic ill health and early death. However, developing complications is not inevitable.

### 2.1 Complications of diabetes

Diabetes can result in a range of short- and long-term complications which are the major causes of associated illnesses and deaths among people with diabetes.

Unfortunately, the longer a person is diabetic, the higher their risk of developing complications. This link is especially worrying in view of the increase in type 2 diabetes in young adults and children. In the Pacific Islands, rates of complications tend to be much higher than those in other countries. In contrast to a large number of countries where many individuals with diabetes lead full and healthy lives without problems for many years, diabetes is a significant cause of sickness and death in this region. Although the precise reasons have not been established, it is likely that poor diabetes control and poor lifestyle are the key factors determining this difference.

#### *What causes the complications?*

Most complications of diabetes are linked to the unusually high levels of blood glucose (blood sugar) that people with diabetes experience. This condition is called **hyperglycaemia**.

While the blood glucose level is high, most people feel well and show no obvious signs or symptoms of diabetes. At the same time, however, this high level of blood glucose is damaging different parts of the body. It is only when levels are incredibly high that any symptoms are seen (and these are normally the initial signs seen in people with undiagnosed diabetes), such as passing a lot of urine, being very thirsty (drinking a lot), having blurred vision, and being tired. Refer to the box on diabetic ketoacidosis (DKA) below.

## Diabetic ketoacidosis (DKA)

### What is DKA?

- ▶ Diabetic ketoacidosis is an acute metabolic complication of diabetes.
- ▶ DKA occurs mostly in type 1 diabetes. It is characterised by hyperglycaemia, hyperketonaemia and metabolic acidosis

### Symptoms

It causes nausea, vomiting, and abdominal pain and can progress to cerebral oedema, coma and death.

### Diagnosis

DKA is diagnosed by detection of hyperketonaemia and anion gap metabolic acidosis in the presence of hyperglycaemia.

### Treatment

Treatment involves volume expansion, insulin replacement, and prevention of hypokalaemia.

### Triggers

Common physiologic stresses that can trigger DKA include acute infection (particularly pneumonia and urinary tract infection), myocardial infarction, stroke, pancreatitis and trauma. Drugs implicated in causing DKA include corticosteroids, thiazide diuretics and sympathomimetics. DKA is less common in type 2 diabetes, but it may occur in situations of unusual physiologic stress.

### *What are the possible complications?*

Undiagnosed diabetes or poor diabetes control over the long term can damage different parts of the body. It mainly affects blood vessels and nerves in different parts of the body. We can think of two categories of complications:

1. **Macrovascular** complications involve damage to important larger blood vessels.  
**Cardiovascular disease (CVD) is the major cause of morbidity and mortality** for people with diabetes and the largest contributor to the direct and indirect costs of diabetes. The common conditions coexisting with type 2 diabetes (e.g. hypertension and dyslipidaemia) are clear risk factors for CVD, and diabetes itself confers independent risk. Macrovascular complications involve:
  - damage to the blood vessels in the heart (increasing the risk of a heart attack);
  - damage to the blood vessels in the brain (increasing the risk of a stroke);
  - damage of the blood vessels and nerves in the legs and feet (increasing the risk of ulcers, which often heal poorly, sometimes leading to amputation); and/or
  - in men, damage to the blood vessels and nerves in the penis (leading to impotence).
2. **Microvascular** complications include:
  - retinopathy (eye problems), which can cause permanent blindness;
  - nephropathy (kidney damage), which can cause kidney failure; and
  - neuropathy (nerve damage), which may involve damage to nerves that carry information to the brain or muscles (peripheral neuropathy) or damage to nerves that control the heart and blood vessels, digestive system, urinary tract, sex organs, sweat glands and eyes.

Other complications include:

- ▶ gum disease, increasing the risk of losing teeth;
- ▶ reduced blood flow, often leading to poor circulation in hands and feet;
- ▶ reduced immune resistance (i.e. a lowered ability to fight infections and disease);
- ▶ prone to bacterial and fungal infection (e.g. oral and vaginal candidiasis, bacterial foot infection including osteomyelitis); and
- ▶ slowed healing.

The combination of these problems sometimes results in infected and long-term wounds on hands and feet, requiring amputation of feet or legs.

### *Risk factors*

Risk factors for complications are:

- ▶ high blood glucose levels (poor control)
- ▶ high blood pressure
- ▶ high blood cholesterol and triglycerides (blood fats)
- ▶ obesity or overweight
- ▶ smoking
- ▶ physical inactivity or low activity levels
- ▶ poor diet
- ▶ excessive alcohol intake
- ▶ stress

## *2.2 Preventing or minimising complications*

Complications can be prevented or minimised if a person with diabetes:

- ▶ keeps blood glucose levels as near to normal levels as possible;
- ▶ has a healthy lifestyle with regular physical activity, no smoking, a moderate alcohol intake and a healthy, balanced diet;
- ▶ maintains a healthy weight (losing weight if overweight);
- ▶ has regular reviews of blood pressure and gets treatment for hypertension (high blood pressure);
- ▶ has regular reviews of cholesterol and triglycerides, and gets treatment if levels are raised;
- ▶ has regular foot examinations and gets foot problems managed by a health professional; and
- ▶ has regular eye examinations (to look for early signs of changes).

### *Role of the community health worker*

Community health workers should be able to give appropriate information to help and encourage the person with diabetes to adapt their lifestyle in ways that prevent or minimise the impact of diabetes complications. To provide this kind of education effectively, it is essential for community health workers to understand the causes, features and effects of these complications and their impact on the individual's daily life.

# *Learning module 3: Finding and helping people with diabetes – (1) identifying people with diabetes*

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This two-part learning module covers:

- ▶ Topic 3.1: Identifying people with diabetes
- ▶ Topic 3.2: Early diagnosis and referral

This first part deals with Topic 3.1: Identifying people with diabetes.

## *Learning objectives*

After this session, participants will be able to:

1. describe the different types of tests that can be used to identify people with undiagnosed diabetes;
2. understand how people without a diagnosis of diabetes after testing can still be at increased risk of diabetes ('pre-diabetes'); and
3. know that in the case of pregnant women, a diabetes risk assessment should be carried out at the first prenatal visit and GDM testing at 26–28 weeks of gestation.

For approximate session timing, refer to the suggested timetable on page 12.

## *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ PowerPoint slide 17

## *Additional resources*

- ▶ Flipchart page 'Diabetes can damage the body'

## Key points: Identifying people with diabetes

### *Urine test for glucose*

In earlier years, it was common to use a urine test to identify people with diabetes, particularly in the field, as it was easy to administer. It is now recognised that this test is not sufficiently accurate. When blood glucose levels are too high, some of the excess begins to appear in the urine (normally there is none in urine). However, the glucose only enters the urine when blood levels are **extremely** high. This test, therefore, while picking up individuals with extremely high blood glucose levels, will miss a lot of other people who should be diagnosed with diabetes.

### *Blood tests*

To accurately identify diabetes:

- ▶ a venous blood sample should be taken as it is more accurate than a finger-prick test (which is fine for monitoring, but not for diagnosis);
- ▶ the patient should fast overnight, then the blood sample is taken in the morning;
- ▶ it is usually recommended that two positive results are gained (on two different days) before a diagnosis of diabetes is confirmed; and
- ▶ capillary blood glucose measurement using a desktop meter may be used for testing for undiagnosed diabetes as long as it is confirmed by venous plasma measurement. Urine testing is not sufficiently sensitive or specific as a screening test for undiagnosed diabetes.[13]

### Diabetes diagnosis: three possible ways

The diagnosis of diabetes is made in **one of the following three ways** but each must be confirmed on a subsequent day unless unequivocal hyperglycaemia with acute metabolic decompensation or obvious symptoms are present:

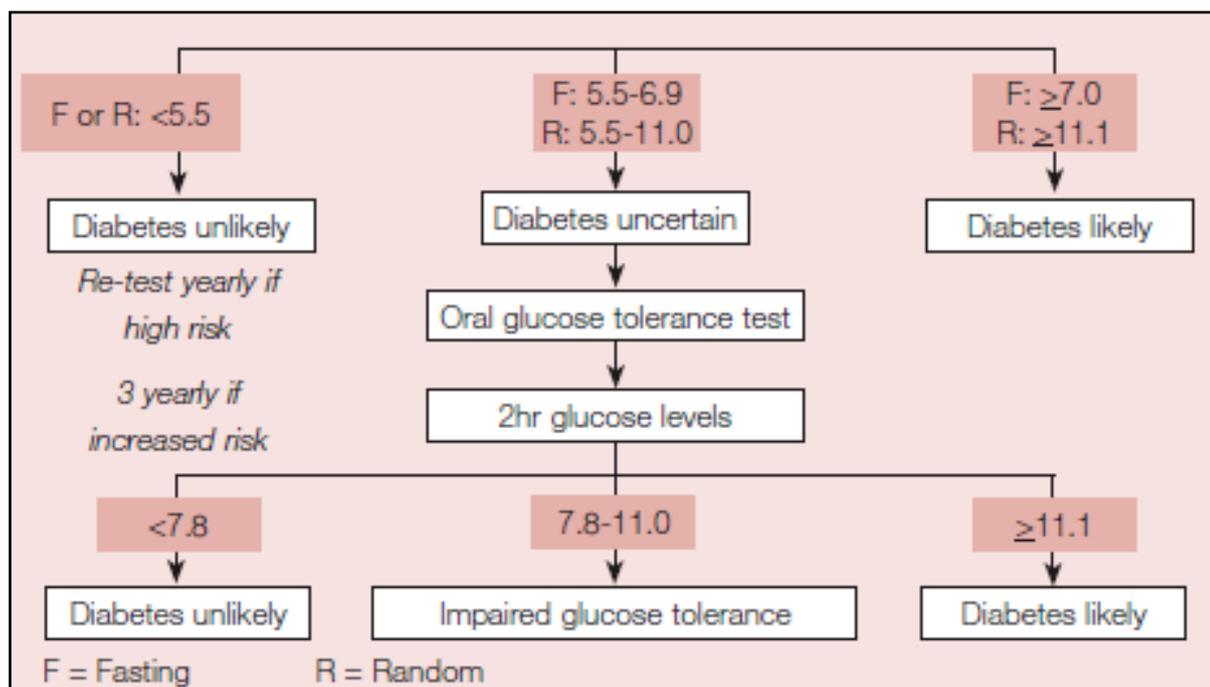
1. symptoms of diabetes and a random (non-fasting) blood glucose  $> 11$  mmol/L; or
2. fasting plasma glucose  $\geq 7.0$  mmol/L; or
3. 2-hour plasma glucose  $> 11$  mmol/L during an oral glucose tolerance test (OGTT).

(Refer to Figure 5.)

### *Oral glucose tolerance test (OGTT)*

The OGTT is unnecessary to diagnose diabetes in people with an unequivocally elevated fasting or random plasma glucose. An OGTT needs to be performed in a person with an equivocal (unclear) result (see Figure 5). The test is carried out after an overnight fast, following three days of adequate carbohydrate intake (greater than 150 g per day). A 75 g load of oral glucose is given and the diagnosis of diabetes can be made if venous plasma glucose level fasting is  $\geq 7.0$  mmol/L or 2-hour post glucose load is  $\geq 11.1$  mmol/L.

**Figure 5: Glucose levels – venous plasma: mmol/L**



Source: Diabetes Australia and RACGP[13]

**Table 7: Cut-off levels for a diabetes diagnosis from OGTT fasting samples**

Diagnosis	Fasting plasma venous glucose mmol/L (mg/dl)	Plasma venous glucose 2 hours post-glucose load mmol/L (mg/dl)
<b>Diabetes</b> (both types of test are not necessary for diagnosis)	>7.0 (≥ 126)	≥ 11.1 (≥ 200)
<b>Impaired glucose tolerance (IGT)*</b> (must have both levels for diagnosis)	<7.0 (≤ 126)	≥ 7.8 to <11.1 (<200)

Note:

\* An IGT diagnosis carries an increased risk of becoming diabetic later. However, IGT is not diabetes. Evidence shows that losing extra weight and improving lifestyle can reduce the risk of developing diabetes in people with IGT.

### *Identifying gestational diabetes mellitus (GDM)*

The current epidemic of obesity and diabetes has led to more type 2 diabetes in women of childbearing age, while the number of pregnant women with undiagnosed type 2 diabetes has increased. Pregnancy tends to cause diabetes in those who are genetically predisposed to this disease.

#### Screening of pregnant women

- ▶ All pregnant women should be screened at between 26 and 28 weeks of gestation with a non-fasting modified glucose tolerance test.
- ▶ This test can be done using a 50 g or 75 g load and plasma glucose taken 1 hour after the load.
- ▶ Women whose levels are  $>7.8$  mmol/L (50 g load) or 8.0 mmol/L (75 g load) should have a formal (fasting) 75 g oral glucose tolerance test.
- ▶ Women who have a history of GDM should have regular screening (see related paragraph below).

Routine screening does not remove the need for earlier testing if clinically indicated (e.g. glycosuria at 12 weeks gestation, family history, previous gestational diabetes, poor obstetric history). Table 8 sets out the process for testing for and diagnosing GDM.

Women whose oral glucose tolerance test confirms gestational diabetes (fasting  $\geq 5.5$ ; 2 hours  $\geq 8.0$  mmol/L) or diabetes should, if possible, be managed by an obstetrician and physician specialising in this condition.

It is very important to ensure follow-up of women with GDM. Women with GDM should be screened for diabetes 6–12 weeks postpartum and should be followed up with subsequent screening for the development of diabetes or pre-diabetes. A glucose tolerance test at 3 months postpartum will usually show reversion to a normal state. However, 10 to 50 per cent of women who have had gestational diabetes will have type 2 diabetes within 5 years and the prevalence steadily increases with time.

Women who have had GDM should be encouraged to exercise regularly, to maintain an optimal weight and to be tested every 1–2 years. If a woman is planning another pregnancy she needs to check for diabetes before stopping contraception and check again at 12 and 26 weeks' gestation.

Women who have a **history of GDM** should have regular screening:[13]

- ▶ All women with previous gestational diabetes should be offered testing for diabetes with a 75 g OGTT at 6–8 and 12 weeks after delivery.
- ▶ Repeat testing should be performed every 1–2 years among women with normal glucose tolerance and the potential for further pregnancies.
- ▶ If no further pregnancy is planned, follow-up testing should be performed every 1–2 years for women with normal glucose tolerance and the potential for further pregnancies, and every 3 years if pregnancy is not possible.
- ▶ More frequent re-testing depends on the clinical circumstances (e.g. ethnicity, past history of insulin treatment in pregnancy, recurrent episodes of gestational diabetes).

**Table 8: Testing for and diagnosing GDM[13,14]**

- ▶ Diabetes risk assessment should be carried out at the first prenatal visit.
- ▶ Women at very high risk should be screened for diabetes as soon as possible after the confirmation of pregnancy. Criteria for very high risk are:
  - severe obesity;
  - prior history of GDM or delivery of large-for-gestational-age infant;
  - presence of glycosuria (excretion of glucose into the urine);
  - diagnosis of polycystic ovarian syndrome (POCS) – the most common cause of female infertility; and
  - strong family history of type 2 diabetes.
- ▶ Screening and diagnosis at this stage of pregnancy should use standard diagnostic testing.
- ▶ Screen for GDM using risk factor analysis and, if appropriate, an OGTT.
- ▶ All women from Pacific Island countries and territories, including those not found to have diabetes early in pregnancy in the screening described above, should undergo GDM testing at 26–28 weeks of gestation.

#### *GDM screening at 26–28 weeks' gestation*

Two approaches may be followed for GDM screening at 26–28 weeks:

##### Two-step approach

1. Perform initial screening by measuring plasma or serum glucose 1 hour after a 50 g load of  $\geq 140$  mg/dl. This test identifies about 80 per cent of women with GDM, while a threshold of  $\geq 130$  mg/dl further increases the sensitivity to about 90 per cent.
2. Perform a diagnostic 100 g OGTT on a separate day in women who exceed the chosen threshold on 50 g screening.

##### One-step approach

1. Perform a diagnostic 100 g OGTT in all women to be tested at 26–28 weeks.
  - ▶ This approach may be preferred in clinics with high prevalence of GDM.
  - ▶ The 100 g OGTT should be performed in the morning after an overnight fast of at least 8 hours.
  - ▶ To make a diagnosis of GDM, at least two of the following plasma glucose values must be found:
    - fasting  $\geq 95$  mg/dl
    - 1 hour  $\geq 180$  mg/dl
    - 2 hours  $\geq 155$  mg/dl
    - 3 hours  $\geq 140$  mg/dl

#### *'Pre-diabetes' – people without a diagnosis, but at increased risk of diabetes*

- ▶ There is an intermediate group of individuals whose glucose levels, although not meeting criteria for diabetes, are nevertheless too high to be considered normal.
- ▶ This group is defined as having impaired fasting glucose (IFG), meaning fasting plasma glucose levels of 100 mg/dl (5.6 mmol/l) to 125 mg/dl (6.9 mmol/l); or impaired glucose tolerance (IGT), meaning 2-hour OGTT values of 140 mg/dl (7.8 mmol/l) to 199 mg/dl (11.0 mmol/l). (See Table 9.)
- ▶ Individuals with IFG and/or IGT have been referred to as having pre-diabetes, indicating they have a relatively high risk of developing diabetes in future. IFG and IGT should be viewed as risk factors for diabetes as well as for cardiovascular disease (CVD). As with individuals found to have IFG and IGT, people with a glycosylated haemoglobin (HbA1c) of 5.7–6.4 per cent should be informed of their increased risk of diabetes as well as of CVD and should be given counselling advice about effective strategies to lower their risks (see Learning module 7 on prevention).

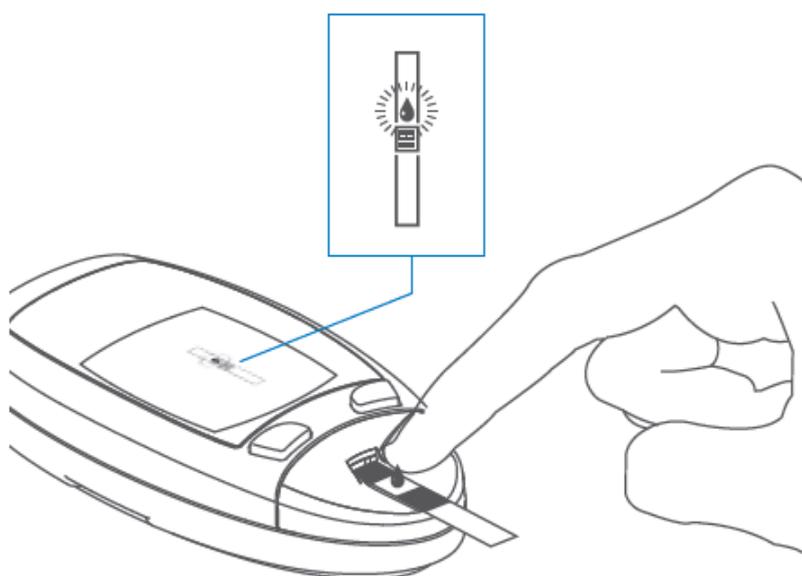
**Table 9: Categories of increased risk of developing diabetes\***

Test	'Pre-diabetes' diagnosis values
Fasting plasma glucose	5.5–6.9 mmol/l (IFG)
2-hour plasma glucose on the 75 g OGTT	7.8–11.0 mmol/l (IGT)
HbA1c	5.7–6.4%

Note:

\* For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at the higher end of the range.

**Figure 6: Example of a blood glucose monitoring device**



Source: Users manual, Betachek® G5 <http://www.betachek.com/PDF/G5%20User%27s%20Manual%20English%20for%20Web.pdf>

Note: Here, the drop of blood is applied with the strip already in the meter.

Figure 7: Understand diabetes – know the warning signs



Source: IDF-WHO World Diabetes Day poster [www.worlddiabetesday.org](http://www.worlddiabetesday.org)

## *Learning module 3: Finding and helping people with diabetes – (2) early diagnosis and referral*

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This two-part learning module covers:

- ▶ Topic 3.1: Identifying people with diabetes
- ▶ Topic 3.2: Early diagnosis and referral

This second part deals with Topic 3.2: Early diagnosis and referral.

### *Learning objectives*

After this session, participants will be aware of the importance of early diagnosis of diabetes and associated problems, and of the criteria for early and appropriate referral. They will be able to:

1. recognise early symptoms of diabetes;
2. identify the complications of diabetes in undiagnosed diabetics; and
3. understand the role of local facilities and the potential referral pathways for assessing problems or potential problems in people who may have diabetes.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information about PowerPoint presentations that support each module – page 2
- ▶ Board and chalk/marker pens

## Key points: Early diagnosis and referral

Type 2 diabetes is a major cause of morbidity and mortality among Pacific Islanders. It is becoming much more widespread and developing at an earlier age.

There is now good evidence that early diagnosis can help reduce complications from diabetes.

All community health workers should be familiar with the early symptoms of diabetes and should encourage people with any of these symptoms to seek appropriate diagnostic testing.

### Referral of people with diabetes

- ▶ Patients with type 1 diabetes often need specialist assessment.
  - ▶ All people with type 2 diabetes need to see an ophthalmologist or optometrist initially and then at least every 2 years.
  - ▶ Consider referral to a diabetes educator or dietitian for consolidation of education.
  - ▶ A podiatrist's help needs to be sought if neuropathy, peripheral vascular disease, foot abnormality or calluses are present.
- (Refer to Appendix 7.)

### Early symptoms of diabetes

Early symptoms of diabetes may include any of the following:

- ▶ frequent urination
- ▶ lack of energy/ tiredness
- ▶ weight loss
- ▶ excessive thirst
- ▶ blurred vision
- ▶ skin infections and slow healing of wounds
- ▶ itchiness

Alternatively there may be no symptoms, or symptoms may develop gradually and so go unnoticed for years.

It is important that the wider community and in particular those identified as being at increased risk of developing diabetes, are aware of these symptoms and know that people must seek testing as soon as possible if they experience any of them.

### Community screening

There are obvious benefits to community screening. It can help to identify:

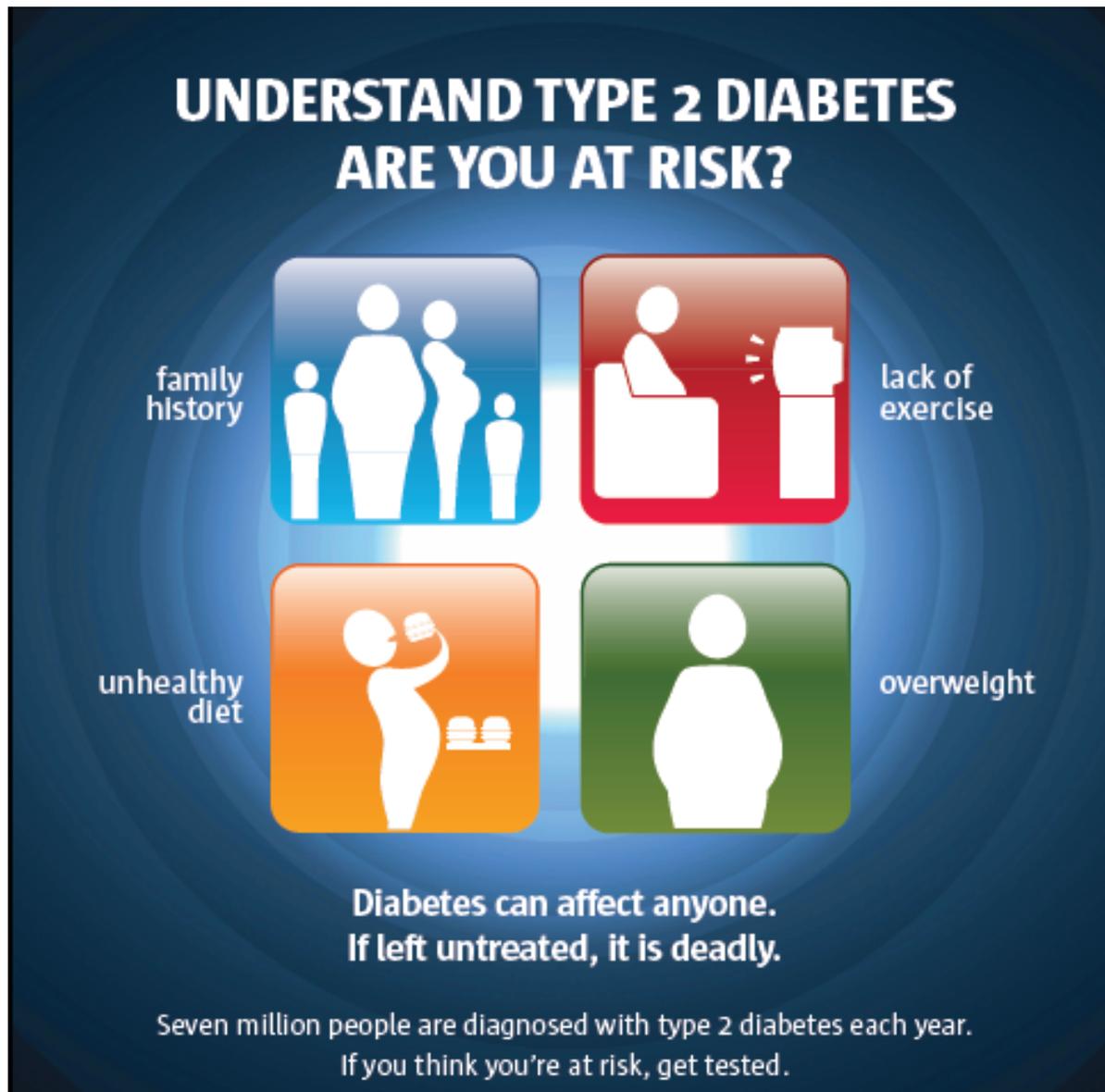
- ▶ people with diabetes while their diabetes is early in its development, even if they have no symptoms; and
- ▶ people with IGT who need to take particular care to avoid diabetes in the future.

Equally a negative result should not be seen as a 'licence' to have an unhealthy lifestyle. An overweight individual whose blood glucose test is normal should still be advised on the benefits of losing weight as they continue to be at risk of developing diabetes.

If during a screening someone is found to have a high blood glucose level:

- ▶ advise them to visit the clinic as soon as possible for a further test to confirm the diagnosis; and
- ▶ give them some basic information to assure them that this is not a final diagnosis and they need a further test.

Figure 8: Understand type 2 diabetes – are you at risk?



Source IDF–WHO World Diabetes Day poster [www.worlddiabetesday.org](http://www.worlddiabetesday.org)

### *Targeting at-risk individuals*

If resources are limited and the entire community cannot be screened, first test those who are most at risk of developing diabetes. People in the high-risk group have two or more of the following risk factors:

- ▶ Pacific Islander;
- ▶ family history of diabetes;
- ▶ overweight (for Pacific Islanders, having a body mass index (BMI) > 27.0);
- ▶ low level of physical activity (failing to meet any of the physical activity guidelines in Topic 5.2 in Learning module 5; e.g. falling well short of doing ‘at least 30 minutes of moderate-intensity physical activity (like a brisk walk) on five or more days each week’); and/or
- ▶ poor diet and lifestyle.

Another way of estimating risk is to use an approved risk assessment tool.

### *Estimating risk using a risk assessment tool*

SPC endorses the use of the risk assessment tool that has been developed by the Australian Government (AUSDRISK).[15] Refer to Appendix 4 to see this tool.

What do the scores on AUSDRISK mean?

- ▶ If you score 15 points or more in the AUSDRISK assessment you may have undiagnosed type 2 diabetes or be at high risk of developing the disease. (See your doctor about having a fasting blood glucose test.)
- ▶ If you score 6–14 points in the AUSDRISK assessment you may be at increased risk of type 2 diabetes. (Discuss your score with your doctor.)
- ▶ If you score 15 points or more you are at high risk of developing diabetes in the next 5 years (approximately one person in every seven with a score in this range will get diabetes).
- ▶ If your score is 20 points or higher, you are at very high risk of developing diabetes (approximately one person in every three with a score in this range will get diabetes).

### *Referral of patients*

#### *Diabetes clinic*

For situations where a diabetes clinic is available, Appendix 7 provides a guide for referral of patients to the diabetes clinic from local health centre clinics (or equivalent).

#### *Key professionals (diabetes educator, dietitian etc.)*

For situations where you have the ability to refer patients to specialist professionals, Table 10 sets out information on when to refer, and what role you can expect that professional to play in the management of the person with diabetes.

**Table 10: Referral pathways – the key professionals and their roles**

Key professionals	When to refer patient	Role
Diabetes educator	Initially and then as patient becomes more familiar with management, as considered necessary by patient, doctor or diabetes educator	The diabetes educator can often spend more time than a doctor has available. The diabetes educator can <b>consolidate the patient's knowledge and skills</b> regarding an eating plan, physical activity, self-monitoring, medication usage and foot care.
Dietitian	Ideally initially, then as considered necessary by patient, doctor or dietitian	The role of the dietitian in the management of diabetes is of central importance. Early referral to a dietitian is desirable to ensure <b>detailed education on management</b> . Lifestyle changes alone (healthy food and regular physical activity with ensuing weight loss) are sufficient for glycaemic control in the majority of patients with newly diagnosed type 2 diabetes. Recommendations should ideally be tailored to the needs of the individual to maximise cooperation.
Podiatrist	Ideally initially, and then regularly if the patient has peripheral vascular disease, neuropathy, skin and/or nail problems and if he/she has difficulty in cutting toenails. Consider referral to a high-risk foot clinic (as available) if ulceration or intractable foot pain is present.	The podiatrist provides <b>expert preventive care</b> . If there is evidence of neuropathy, macro-vascular disease, anatomical problems or a previous foot problem, <b>regular review</b> is necessary. Foot complications are the most common cause of non-traumatic amputation.
Ophthalmologist or optometrist	<ul style="list-style-type: none"> <li>• Fundal examination (dilated pupils).</li> <li>• Checking for the presence of cataracts</li> <li>• Assessment: <ul style="list-style-type: none"> <li>– prepubertal children – referral at puberty</li> <li>– adults – referral at time of initial diagnosis</li> <li>– thereafter at least every 2 years</li> </ul> </li> </ul>	All people with diabetes need to be assessed regularly by an ophthalmologist or optometrist. Early detection of retinopathy, before vision is lost, markedly improves prognosis for sight. Any deterioration in vision requires immediate referral back to the ophthalmologist.
Endocrinologist or paediatrician	<ul style="list-style-type: none"> <li>• Children, adolescents and adults with type 1 diabetes if the doctor is not confident with management.</li> <li>• Pregnant women with established diabetes and women with gestational diabetes.</li> <li>• People with diabetes and uncontrolled hyperglycaemia or with significant complications.</li> </ul>	The advice of a specialist may be valuable for people with complicated problems related to diabetes – especially children, adolescents and adults with type 1 diabetes or diabetes in pregnancy.

# Learning module 4:

## Monitoring and screening for complications

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This learning module covers:

- ▶ Topic 4.1: Monitoring blood glucose levels
- ▶ Topic 4.2: Screening for complications

### *Learning objectives*

After this session, participants will understand the available laboratory and physical approaches to assessing glycaemic control and potential diabetes problems. They will be able to:

1. explain the difference between a finger-prick blood glucose test and glycosylated haemoglobin (HbA1c);
2. explain the importance of blood glucose testing in the assessment of glycaemic control;
3. describe each of the monitoring tests that should be done; and
4. explain why each of the monitoring tests is important.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Weighing scales and height measure
- ▶ Eye chart
- ▶ Ophthalmoscope
- ▶ Stethoscope and sphygmomanometer
- ▶ ‘Urine’ specimen
- ▶ Urine testing strips for microalbumin and protein
- ▶ DCA 2000 (if available), cartridge, lancet and cotton wool
- ▶ Blood glucose meter, testing strips, lancet and cotton wool

### *Additional resources*

Flipchart pages ‘Management of diabetes’ and ‘Prevention of complications and damage to the body’

## Key points: Monitoring and screening for complications

Cardiovascular disease (CVD) is the major cause of illness and death for individuals with diabetes and it is the largest contributor to the direct and indirect costs of diabetes. The common conditions that exist alongside type 2 diabetes (e.g., hypertension and dyslipidaemia) are clear risk factors for CVD, and diabetes itself confers risk independently of these. Numerous studies have shown the efficacy of controlling individual cardiovascular risk factors in preventing or slowing CVD in people with diabetes. Large benefits are seen when multiple risk factors are addressed at the population level.[16]

Diabetes complications are not inevitable: they can be prevented or minimised with regular screening and early detection. Regular laboratory tests and physical examinations, including an annual screening for long-term complications, should be undertaken by the doctor, diabetes clinic or community health worker.

It is important that community health workers can interpret and understand the assessment results that may be used to help the person with diabetes to develop strategies to delay or prevent long-term damage.

**Note:** Unfortunately, not all these tests are available in all places.

### 4.1 Monitoring blood glucose levels

Blood glucose levels can be monitored in either of the ways outlined below, according to what resources are available. See Table 11 for an overview of how to interpret the results in terms of the level of control achieved.

#### 1. The **finger-prick blood glucose test:**

- ▶ uses a blood glucose meter;
- ▶ can tell us what the blood glucose level is at the time the test is done;
- ▶ can be done at every visit (some patients may purchase their own meter);
- ▶ is normally taken after fasting overnight; and
- ▶ has a normal range of between 4 and 7.7 mmol/L (see Table 11 for interpretation).

**1. Glycosylated haemoglobin (HbA1c)** measures the blood glucose control over about 3 months. Haemoglobin, produced in the body, stays with each red blood cell for that cell's entire life, which is about 120 days. As the red blood cell circulates in the body, glucose slowly attaches to the haemoglobin. More glucose will be attached if diabetes control is poor.

The HbA1c level gives an average blood glucose level over the past 2 to 3 months. Values lower than 7 per cent are usually recommended (although the doctor may recommend a target of 6.5 per cent if a person is at particular risk of complications).

## 4.2 Screening for complications

### Cholesterol and triglycerides (blood fats) test

- ▶ A fasting (venous) blood sample is collected and tested by the pathology laboratory (or with special portable analysers).
- ▶ This test will give results for blood cholesterol (preferably broken down into HDL and LDL values) and blood triglyceride. High LDL and triglyceride values (and low HDL values) indicate increased risk of heart disease. See Table 11 for an overview of how to interpret the various values.

### Urine test

A urine test can be used to check for protein in the urine, which is an early sign of kidney damage (nephropathy). Urine levels of sugar are not the best indicator of blood glucose levels; generally blood glucose levels have to be extremely high before any effect is seen in urine. However if other tests are prohibitively expensive there is still value in having these results.

### Blood pressure measurement

- ▶ People with diabetes are at an increased risk of heart disease and stroke. Another key risk factor for these two problems is high blood pressure. A systolic blood pressure of more than 130 mmHg and/or a diastolic blood pressure of more than 80 mmHg requires intervention – initially lifestyle advice (see Table 11).
- ▶ Blood pressure should be measured regularly.
- ▶ One blood pressure reading is not enough to diagnose high blood pressure (hypertension). At least two tests should be done. Blood pressure is easily increased by the stress associated with visiting a health centre.

### Eye examination

- ▶ Visual acuity (eyesight) should be tested using an eye chart.
- ▶ Drops should be put in the eyes to dilate the pupils so that the back of the eyes can be examined, using an ophthalmoscope, for damage to the small blood vessels in the retina or lining of the eye (retinopathy) and for cataracts.
- ▶ A regular eye examination (every year) is recommended because people with diabetic eye problems often do not know they are developing these problems until they are found on examination.

**Table 11: Interpreting measurements against management targets**

Measurement	Targets	Comment								
<b>Blood glucose control (HbA1c)</b>	$\leq 7\%$	<p>HbA1c &gt; 7% should prompt more active hypoglycaemic treatment.</p> <p>Epidemiological evidence has suggested that the lower the HbA1c, the lower the risk of cardiovascular events in both type 1 and type 2 diabetes. However, recent trials in patients at moderate to high risk of cardiovascular events <b>do not support this conclusion</b>.</p> <p><b>The recommended target remains <math>\leq 7\%</math>.</b></p> <p>Note that over-zealous management can result in severe hypoglycaemia and may be associated with an increase in mortality.</p>								
<b>Blood glucose levels mmol/L (using Betachek)</b>	<table border="1"> <thead> <tr> <th>Preprandial</th> <th>Postprandial</th> </tr> </thead> <tbody> <tr> <td>4.0–6.0</td> <td>4.0–7.7</td> </tr> <tr> <td>6.1–6.9</td> <td>7.8–11.0</td> </tr> <tr> <td><math>\geq 7.0</math></td> <td><math>\geq 11.0</math></td> </tr> </tbody> </table>	Preprandial	Postprandial	4.0–6.0	4.0–7.7	6.1–6.9	7.8–11.0	$\geq 7.0$	$\geq 11.0$	<p>Normal glucose concentration</p> <p>Minimises microvascular problems</p> <p>Associated with micro and macrovascular complications. Consider more active treatment.</p>
Preprandial	Postprandial									
4.0–6.0	4.0–7.7									
6.1–6.9	7.8–11.0									
$\geq 7.0$	$\geq 11.0$									
<b>Blood pressure</b>	<p><math>\leq 130/80</math></p> <p>&lt; 125/75 if proteinuria &gt; 1 g/d present</p> <p><b>Getting to target</b></p> <p><b>Step 1:</b> Healthy eating, physical activity, weight control</p> <p><b>Step 2:</b> ACE inhibitor or ARA if ACE inhibitor not tolerated</p> <p><b>Step 3:</b> ACE inhibitor and diuretic</p> <p><b>Step 4:</b> Beta-blocker</p>	<ul style="list-style-type: none"> <li>▶ Blood pressure control reduces macro and microvascular complications.</li> <li>▶ Non pharmacological measures should be tried first.</li> <li>▶ Preferred initial pharmacological agents are ACE inhibitors for most patients.</li> <li>▶ To achieve blood pressure targets, combination therapy is often required.</li> </ul> <p><b>Refer to the four steps on the left.</b></p>								
<b>Total cholesterol mmol/L</b>	< 4.0	<p>Dyslipidaemia is common in patients with diabetes and an independent risk factor for the macrovascular complications of diabetes.</p> <p>Non pharmacological measures should be tried first.</p> <p>Preferred agents are HMG CoA reductase inhibitors, ezetrol and resins for hypercholesterolaemia and fibrates for hypertriglyceridaemia.</p>								
<b>HDL cholesterol mmol/L</b>	$\geq 1.0$									
<b>LDL cholesterol mmol/L</b>	< 2.5									
<b>Urinary albumin excretion</b>	<p>&lt; 20 <math>\mu\text{g}/\text{min}</math> (timed overnight collection)</p> <p>&lt; 20 mg/L (spot collection)</p> <p>&lt; 3.5 mg/mmol: women</p> <p>&lt; 2.5 mg/mmol: men (albumin creatinine ratio)</p>	<p>Microalbuminuria gives early warning of renal damage – check at annual review.</p>								

Source: Adapted from Diabetes Australia and RACGP guidelines[13]

### Foot examination

- ▶ Shoes and socks should be taken off and the entire foot examined for signs of damage.
- ▶ Unless adequate care is given immediately, simple foot problems in people with diabetes can worsen and become much more serious very quickly.

See Topic 5.4: Care of the feet, in Learning module 5.

### Height and weight measurement

- ▶ Height and weight should be measured initially and then weight measured regularly.
- ▶ Being overweight is a risk factor for heart disease and hypertension. It also interferes with insulin action (making blood glucose control more difficult).

Body mass index (BMI) is assessed by dividing weight (kilograms) by height squared (metres). For example:

Weight = 90 kg

Height = 1.7 m

BMI =  $90 \div (1.7 \times 1.7) = 31.1$

There are internationally agreed cut-offs for BMI that classify individuals as overweight, normal weight and so on. However, evidence has suggested that most Pacific Islanders (especially Polynesians) may be incorrectly classified using these cut-offs. For this reason, SPC recommends using slightly different cut-offs, as indicated in Table 12.

**Table 12: International and region-specific cut-off points for BMI classifications**

Category	International classification	SPC recommended classification for Pacific Islanders
Normal	18.5–24.9	22–27
Overweight	$\geq 25.0$	$> 27.0$
Obese	$> 30.0$	$> 32.0$

BMI can also be assessed using the SPC weight:height chart.

Body mass index (BMI) is a measure of general obesity, whereas waist circumference, and waist: hip ratio are measures of central obesity. The evidence to date indicates that body mass index, waist circumference and waist:hip ratio are quite similar in their ability to predict the incidence of diabetes.[17, 19]

### Dental examinations

Regular visits to the dentist are recommended.

# *Learning module 5:*

## *Patient and family education*

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This learning module covers:

- ▶ Topic 5.1: Dietary management
- ▶ Topic 5.2: Physical activity
- ▶ Topic 5.3: Healthy lifestyle
- ▶ Topic 5.4: Care of the feet

### *Additional resources*

Flipchart page 'Management of diabetes'

For further information on learning objectives, session time and resources, see the specific topics in this learning module.

## 5.1 Dietary management

### Learning objectives

The main purpose of this topic is to look at the role of diet in the management of diabetes. Key points to consider are:

- ▶ amount of food – portion sizes
- ▶ regular meals
- ▶ types of foods
  - starchy root crops (energy foods)
  - fruit and vegetables (protective foods)
  - proteins (body building foods)
  - fats and fatty foods
  - salt and salty foods
  - sugar and sugary foods

After this session, participants will understand the principles of the diet for good diabetes control. They will be able to:

1. list the basic food groups;
2. define basic dietary guidelines for people with type 2 diabetes;
3. take a basic 24-hour food history; and
4. summarise how weight loss is recommended for all overweight or obese individuals who have or are at risk of developing diabetes and understand the role of diet and physical activity in weight management.

For approximate session timing, refer to the suggested timetable on page 12.

### Resources

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ 24-hour food record – page 50
- ▶ Food models or samples

## Key points: Dietary management

Healthy diet is important to help people with diabetes control blood glucose levels and reduce the risk of complications. Without a healthy diet, neither of these management goals can be achieved.

The diet recommended for people with diabetes is the same as that recommended for the general population; **the main thrust of diabetes management is to lower total fat intake and to find substitutes for saturated fats**. In terms of proportions eaten from each food group over a whole day, a person should eat:

- ▶ about half of their foods from the (starchy) **energy** group;
- ▶ about one third of their foods from the **protective** (fruits and vegetables) group; and
- ▶ the remainder of their foods from the **body-building** group.

See more information on each of these groups in the section that follows.

In making choices within each food group, it is recommended that a person consumes:

- ▶ foods with a low fat content;
- ▶ minimal added sugar;
- ▶ a moderate amount of alcohol only (one standard drink per day or less for adult women and two standard drinks per day or less for adult men);
- ▶ fibre-rich foods; and
- ▶ a variety of foods.

Advise patients on the following important elements of a healthy diet.

### *The basic food groups*

Starchy **energy foods** are better energy foods than sugary energy foods. When digested, they release glucose slowly into the blood stream, preventing rapid peaks in levels. Local starchy root crops are also high in fibre.

To avoid sharp rises in blood glucose levels, starchy energy foods should be eaten at regular intervals during the day. It is best to avoid large meals; instead, spread out food over smaller meals during the day. Starchy energy foods should be included at every meal. Over the whole day, half of your food should be from the energy food group.

(Starchy) **energy foods** include:

- ▶ taro, cassava, yam, breadfruit, sweet potato and cooking/plantain banana; and
- ▶ bread, roti, breakfast cereals, potato, rice and flour.

For people with diabetes who are able to understand and wish to do so, using the 'glycaemic index' (GI) and glycaemic load may provide a modest additional benefit for glycaemic control. In practice it is recommended that people with diabetes have one high-fibre, low-GI carbohydrate food at each meal.[13] This kind of food includes wholegrain breads, rolled oats, low-fat, low-sugar breakfast cereals, pasta, beans, lentils and temperate fruits. Other carbohydrate foods such as rice, potato and tropical fruits can be included but in lesser amounts.

### The glycaemic index (GI)

- ▶ The glycaemic index ranks carbohydrates according to their effect on our blood glucose levels.
- ▶ Choosing low-GI carbohydrates (those that produce only small fluctuations in our blood glucose and insulin levels) is a key to long-term health, by reducing the risk of heart disease and diabetes, and to sustainable weight loss.
- ▶ In practice it is recommended that people with diabetes have one high-fibre, low-GI carbohydrate food at each meal.
- ▶ The official website of the GI may be found at: <http://www.glycemicindex.com>

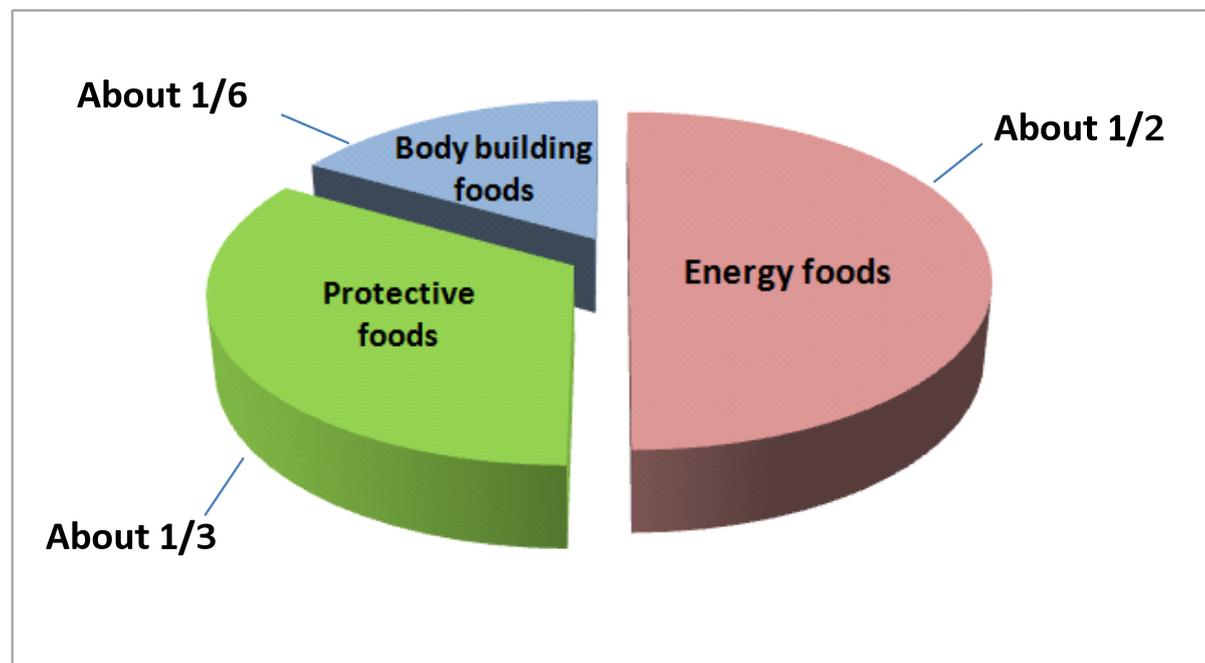
Eating a variety of **fruits and vegetables** is recommended to ensure that your body gets the full range of required vitamins and minerals. It is because of their high vitamin and mineral content that fruits and vegetables are considered to be **protective foods**. About one third of food each day should be from this food group. It is possible to consume this amount by including fruits and vegetables at most meals, and choosing fruit as a snack.

There is natural sugar in fruit and fruit juices (avoid fruit juices with added sugar). This small amount of natural sugar does not affect the blood glucose level as much as table sugar does. However, it is a good idea to spread fruit out over the day, rather than eating a lot all at once. It is also better to choose:

- ▶ a whole fruit rather than just its juice; and
- ▶ fresh fruit rather than canned fruit, even when the canned fruit is in juice.

This protective food group includes all fruits and vegetables, except for potatoes and root crops (which are energy foods).

**Figure 9: Pacific food guide**



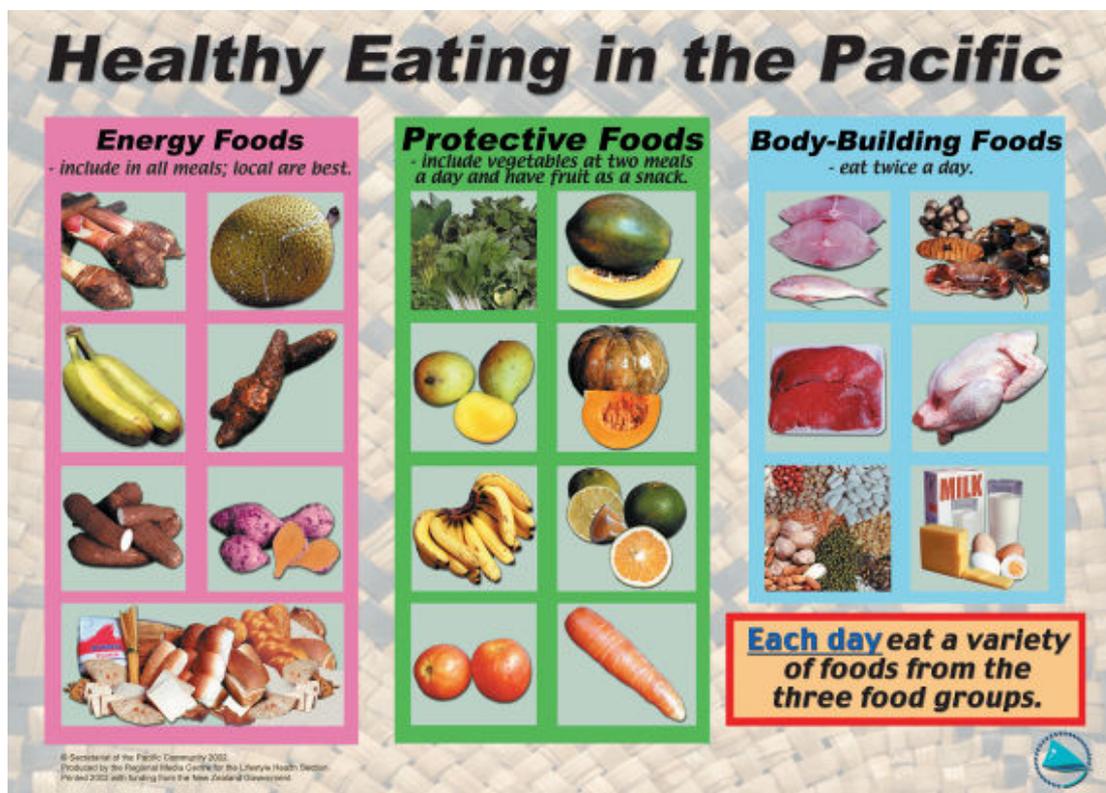
*Each day eat a variety of foods from the three food groups in the right amounts.*

Vegetables include:

- ▶ green leaves like chaya, bele, spinach, kangkong, sweet potato leaves and taro leaves;
- ▶ pumpkin, cucumber, tomato, green papaya, and carrots; and
- ▶ frozen and canned vegetables (preferably with no added salt or sugar).

**Body-building foods** include protein-rich foods such as meat, chicken, turkey, fish, shellfish, milk, cheese, beans, lentils, nuts and seeds. Usually you should choose body-building foods that are lower in fat and salt content – such as fresh fish, shellfish and lean red meat or chicken. Other foods in this group that are low in fat as well as high in fibre are beans and lentils. Body-building foods are needed in just small amounts each day for health. A small serving from this group at two meals a day will be adequate for most people.

**Figure 10: Healthy Eating in the Pacific**



Source: SPC

### *How much food should we eat?*

Many people ask how much of each different kind of food they should eat. For example, how many pieces of taro is it healthy to eat?

As a first priority, it is recommended that everyone follows the Pacific food guide (Figure 9 and Figure 10). They should divide the total amount of food they eat each day among the food groups in the proportions set out in the guide. A person can achieve this balance across a number of meals. Thus if the mix of food groups in one meal does not quite meet the guide, an individual can correct the balance at the next snack or meal. For example, if they have no vegetable or fruit at lunch, they might have some fruit in the afternoon.

However, a common problem in the islands is that many people just eat too much food (even if they have well-balanced meals). So, once a person is eating the right proportion of each food group as set out in the food guide, how can they tell if the total amount of food they are eating is right?

First, consider the body weight (for height) of the person with diabetes (or yourself). Is this weight healthy?

If the answer is yes, then it is fine to continue eating the same amounts (as long as the proportions of each food group meet the food guide).

If the answer is no — that is, the person is overweight — then you should consider ways to change their diet to reduce the weight. **Weight loss is recommended for all overweight or obese individuals who have or are at risk of developing diabetes.** The best ways of losing weight are to:

1. be more physically active;
2. follow the food guide (eating too many body-building and not enough protective foods can lead to weight gain);  
and
3. eat less fat and sugar.

If, after taking all of these steps, the person is not losing weight (and is still overweight), then meal portions should be reduced. Note that this step should only be taken **if** the person is already following steps 1–3 above. If they are hungry all the time as a result of eating less food, they are likely to feel unhappy ... and snack.

### *Energy balance, overweight, and obesity[14]*

- ▶ In overweight and obese insulin-resistant individuals, modest weight loss has been shown to reduce insulin resistance. Thus, weight loss is recommended for all overweight or obese individuals who have or are at risk of developing diabetes.
- ▶ For weight loss, either low-carbohydrate or low-fat calorie-restricted diets may be effective in the short term (up to 1 year).
- ▶ For patients on low-carbohydrate diets, monitor lipid profiles, renal function and protein intake (in those with nephropathy) and adjust hypoglycaemic therapy as needed.
- ▶ Physical activity and behaviour modification are important components of weight loss programmes and are most helpful in maintaining weight loss.

### *Which foods should we eat less of?*

Most of us eat more sugar, fat and salt than we need. It is therefore recommended that we all try to eat less of them. This recommendation is particularly important for people with diabetes.

**Sugary foods** give us energy (calories) but often contain little else of nutritional value. While they can be included in a healthy, balanced diet, eating too much often leads to a diet lacking in essential nutrients. For people with diabetes, eating large amounts of sugary foods can cause problems by:

- ▶ increasing blood glucose levels; and
- ▶ leading to unwanted weight gain, making diabetes control more difficult.

**Remember:** For people with diabetes the advice is **not** 'no sugar'. Instead, you can advise that it is all right to have **small amounts of sugary foods within a healthy balanced meal**. In small amounts, they will not cause problems, particularly when the sugary food is included as part of a fibre-rich meal rather than eaten as a snack. Examples of a 'small amount' are: one small biscuit, a small piece of un-iced cake, or one scoop of ice cream. Sugary foods include:

- ▶ table sugar
- ▶ sweets and chocolate
- ▶ honey
- ▶ soft drinks (e.g. sodas, colas, Kool-Aid, Tango)
- ▶ cakes and biscuits/cookies

### *Dietary fat intake in diabetes management*

#### Types of fats

All fats are made up of saturated and unsaturated fatty acids. Fats are called 'saturated' or 'unsaturated' depending on how much of each type of fat they contain.

#### **Dietary fat – some key points**

- ▶ The main thrust of dietary management is to lower total fat intake and to find substitutes for saturated fats.
- ▶ Fat is an important part of a healthy diet – but some fats are better than others.
- ▶ Saturated fats increase blood cholesterol and can increase health risks.
- ▶ Mono-unsaturated and polyunsaturated fats tend to lower blood cholesterol and can reduce risks.
- ▶ Trans fats (or 'trans fatty acids') are potentially harmful and are used to make baked products, pies, cakes, biscuits and buns.
- ▶ Omega-6 and omega-3 fats can benefit your health.

#### 'Saturated' fats

- ▶ Consuming saturated fats raises your LDL ('bad') cholesterol level. High levels of LDL cholesterol puts you at risk of heart attack, stroke and other major health problems. You should avoid or limit foods that are high in saturated fats.
- ▶ Foods with a lot of saturated fats include:
  - animal products like butter, cheese, whole milk, ice cream, cream and fatty meats
  - some vegetable oils like coconut oil, palm oil and palm kernel oil. These vegetable oils are solid at room temperature.

### 'Unsaturated' fats

- ▶ Consuming unsaturated fats instead of saturated fats can help lower your LDL cholesterol level.
- ▶ Most vegetable oils that are liquid at room temperature are unsaturated.
- ▶ There are two kinds of unsaturated fats:
  - **mono**-unsaturated fats (e.g. olive and canola oils);
  - **poly**unsaturated fats (e.g. safflower, sunflower, corn and soybean oils)
- ▶ Omega-6 and omega-3 fats can benefit our health. Examples of foods rich in omega-6 fats include corn, safflower, sunflower and soybean oils. Foods high in omega-3 fats include salmon, halibut, sardines, albacore, trout, herring, walnut, flaxseed oil and canola oil. Other foods that contain omega-3 fats include shrimp, clams, light chunk tuna, catfish, cod and spinach.

### 'Trans fats' (or 'trans fatty acids')

- ▶ Trans fats are rare in nature but are created during the manufacture of some table margarines as well as in solid spreads used in the food industry to make baked products – for example, pies, pastries, cakes and biscuits.
- ▶ Unlike other dietary fats, trans fats are not essential, and they do not promote good health.
- ▶ Consumption of trans fats increases the risk of coronary heart disease by raising levels of 'bad' LDL cholesterol and lowering levels of 'good' HDL cholesterol. Therefore intake of trans fats should be kept to a minimum.
- ▶ Fatty foods do not raise the blood glucose level. However, unless eaten in moderation, they will increase weight and raise the blood lipid (cholesterol) level, which is a risk factor for heart disease. Excess weight makes diabetes control more difficult, and often increases blood glucose levels. Reducing fats and fatty foods can help in efforts to lose weight, which will improve blood glucose control and blood cholesterol levels. Independently of weight, eating less fat will reduce the risk of heart disease.
- ▶ Total fat intake should be < 30 per cent of total calories.
- ▶ Saturated fat intake should be < 7 per cent of total calories.[14]
- ▶ To recap, fatty foods include:
  - butter and oil
  - fried foods (e.g. fried fish, chips, doughnuts, pancakes)
  - foods made with fat such as cakes, biscuits and pastries
  - fatty meat (e.g. Spam, corned beef, turkey tail, mutton flap)
  - coconut milk and cream, and coconut meat (from mature coconut only)
  - mayonnaise
  - ice cream and most other desserts

### Salt

- ▶ Salty foods do not affect blood glucose levels or weight. However, salt can increase blood pressure. High blood pressure is an important risk factor for stroke and heart disease. Because people with diabetes are already at increased risk of heart disease and stroke, avoiding or controlling high blood pressure is a sensible option.
- ▶ Foods high in salt include soy sauce, ketchups and sauces, savoury snacks, canned meats and instant noodles. Even foods such as butter, margarine, breads and biscuits contain salt.

### *Eating fibre*

Eating fibre-rich foods helps to regulate blood glucose levels (and in this way they help to control the peaks that can occur in people with diabetes after meals). Good amounts of fibre are found in:

- ▶ fruit;
- ▶ vegetables;
- ▶ wholewheat/wholemeal bread (which contains more fibre than brown bread), root crops, oats, wholewheat flour and brown rice;
- ▶ lentils and beans; and
- ▶ nuts and seeds.

Fibre is also helpful in keeping the gut healthy. Certain types of fibre, particularly that found in oats, fruits, vegetables and beans, can help to control blood cholesterol levels.

### *Limiting alcohol to moderate consumption*

- ▶ Alcohol contributes to weight gain, and affects blood glucose control. Drinking too much alcohol is also a risk factor for high blood pressure and heart disease.
- ▶ If adults with diabetes choose to use alcohol, daily intake should be limited to a moderate amount (one standard drink per day or less for adult women and two standard drinks per day or less for adult men). This level of consumption is supported by research from the Netherlands which suggests that some moderate alcohol consumption may confer independent health benefits in lowering risk of type 2 diabetes.[20] The study defined 'moderate alcohol consumption' as: 5.0–14.9 grams a day for women; and 5.0–29.9 grams a day for men.
- ▶ One standard drink contains 10 g of alcohol. Examples of one standard drink are:
  - 285 ml full-strength beer or 375 ml light beer (average can);
  - 100 ml wine (small glass); or
  - 30 ml spirit (bar measure).

If a person taking insulin or diabetes tablets (sulphonylureas only) drinks alcohol, they are at risk of **hypoglycaemia** (low blood glucose level) as alcohol lowers the blood glucose level. They should therefore be advised to:

- ▶ take alcohol (if drinking any) with meals or with carbohydrate food; and
- ▶ avoid consuming more than one (women) or two (men) standard drinks in a session or day.

### *Other nutrition recommendations*

- ▶ Sugar alcohols<sup>1</sup> and non-nutritive sweeteners are safe when consumed within the established acceptable daily intake levels.

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1. Sugar alcohols are carbohydrates that are also called 'polyols'. Part of their chemical structure resembles sugar, and part of it resembles alcohol -- hence the confusing name. Look on the label of a packet of sugar-free sweets/candy, and you're likely to see maltitol, xylitol and sorbitol. These are the sugar alcohols.

## 24-hour food record

Name: .....

Date: .....

	What did you eat and drink?	Recommended changes
Early morning		
Breakfast		
During morning		
Lunch		
During afternoon		
Dinner		
During evening		

## 5.2 Physical activity

### Learning objectives

After this session, participants will understand the role of physical activity in diabetes management. They will be able to:

1. access the Pacific Physical Activity Guidelines for Adults and explain the important health benefits of regular physical activity for the community in general;
2. understand the concept of FITT – i.e. frequency, intensity, type and time (duration) of physical activity – as it applies to exercise guidelines for people with diabetes;
3. access and describe the current recommendations and precautions for physical activity to be undertaken by people with diabetes; and
4. consider the issues of adhering to and following up exercise, supporting and counselling clients and ensuring a physical activity programme's sustainability.

For approximate session timing, refer to the suggested timetable on page 12.

### Resources

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2

### A note on this session

Participants may be asked for their own personal views about:

- ▶ their own activity patterns;
- ▶ what types of activities are considered acceptable for males and females of various ages in the community;
- ▶ possible barriers to regular activity and how to overcome them;
- ▶ ways that physical activity might fit into their normal daily routine;
- ▶ how people can best think about doing the types of resistance exercise recommended for people with type 2 diabetes; and
- ▶ ways in which participants can best be supported (1) after they have just started their physical activity programme and (2) in the longer term (after 3 or 6 months).

Participants may be encouraged to take part in some exercise or physical activity during this session. For example, they may go on a 15- to 20-minute walk, join in a stretching and aerobic exercise session, do some local dance movements, or do some gardening.

This session emphasises that physical activity is important for everyone and should be enjoyable. As a community health worker, each participant should act as a role model and encourage others to be physically active each day.

## Key points: Physical activity

### *Physical activity guidelines for health and wellbeing of adults in the community*

General recommendations on physical activity for all healthy adults in the Pacific

Regular physical activity is an important part of any healthy lifestyle. New Pacific Physical Activity Guidelines for Adults were published by SPC and WHO in 2008.<sup>2</sup> The guidelines are available from the Healthy Pacific Lifestyle portal of the SPC website <http://www.spc.int/hpl> and are summarised in Table 13:

- ▶ The Pacific Physical Activity Guidelines for Adults are relevant for all healthy adults aged 18–65 years with no contraindication to physical activity. The guidelines also apply to individuals in this age range with chronic conditions not related to mobility such as asthma, hay fever, hypertension and hearing impairments.
- ▶ Pregnant, postpartum women and people with a history of cardiac events may need to take extra precautions and seek medical advice before starting on a vigorous physical activity regime as indicated in the guidelines.

**Table 13: Pacific physical activity guidelines for healthy adults aged 18–65 years (summary)**

1. If you are not physically active (not moving much), it's not too late to start now! Do regular physical activity and reduce sedentary activities.
2. Be active every day in as many ways as you can, your way.
3. Do at least 30 minutes of moderate-intensity physical activity on 5 or more days each week.
4. If you can, enjoy some regular vigorous-intensity activity for extra health and fitness benefits.

These Pacific Physical Activity Guidelines for healthy adults are explained in more detail in Learning module 7 on diabetes prevention and health promotion.

2. *The recommendations in the Pacific Physical Activity Guidelines for Adults are expected to remain valid until 2013. The Department of Global Strategy on Diet, Physical Activity and Health at WHO will then be responsible for initiating a review of the guidelines.*

Table 14 summarises the recommendations regarding physical activity for people with type 2 diabetes:

- ▶ People with type 2 diabetes should be advised to perform at least 150 minutes a week of moderate-intensity aerobic physical activity (50–70 per cent of maximum heart rate)[14].
- ▶ The length of each individual session can vary, although the aim should be a minimum of 10 minutes per session. Longer sessions (30 to 90 minutes) have typically been used in intervention studies, although recent research has indicated that three short sessions (10 minutes each) per day may be preferable to longer sessions (30 minutes) for glycaemic control inpatients with type 2 diabetes.[21]
- ▶ In the absence of contraindications, people with type 2 diabetes should be encouraged to perform resistance training (muscle-strengthening activities) three times per week.[14]

**Table 14: Summary of physical activity prescription for people with type 2 diabetes**

Type of physical activity	Frequency – how often?	Intensity – how hard?	Time – how long?
Cardio-respiratory (large-muscle activities)	3–7 days a week	Moderate intensity	150 minutes a week
<b>or</b>			
Cardio-respiratory (large-muscle activities)	3 days a week	Vigorous intensity	90 minutes a week
<b>and encourage</b>			
Progressive resistance (strengthening of large muscle groups, multi-joint exercises)	3 days a week	Moderate to high intensity: 2–4 sets of 8–10 repetitions at a weight that cannot be lifted > 8–10 times with 1–2 minutes of rest between sets	

Source: Marwick et al[21]

For **cardio-respiratory** physical activity (large-muscle activities), the following considerations apply:

- ▶ For most patients with type 2 diabetes, the goal of a physical activity programme is to increase energy expenditure, and this is directly related to the amount of muscle mass used during exercise.
- ▶ For this reason, exercises that use a large muscle mass and those that can be performed safely offer the best results. Walking and cycling are good examples.
- ▶ Caution should be applied to prescribing walking, because it can easily be performed at quite low intensity. The walking must be performed at a brisk pace and must be regarded as an ‘exercise walk’ rather than simply as a ‘walk’.

For **progressive resistance** physical activity (strengthening of large-muscle groups, multi-joint exercises), the following considerations apply:

- ▶ Higher intensities of resistance training (three sets of 8 to 10 repetitions at 75 to 85 per cent of the intensity of one repetition maximum) have shown benefits and have been well tolerated by patients with type 2 diabetes.
- ▶ For some patients, lower exercise intensities may be more appropriate.

### *Counselling – tips for giving physical activity advice to people with diabetes<sup>3</sup>*

- ▶ Advice regarding physical activity does not necessarily have to be provided by a doctor. It could be given by a doctor's assistant, exercise specialist, advanced practice nurse, diabetes educator or appropriately trained community health worker.
- ▶ Research studies have shown benefits from supervised exercise training in patients with type 2 diabetes, but this approach may be difficult for services to sustain in the long term.
- ▶ A home-based physical activity programme with exercise counselling offers convenience, flexibility, cost-effectiveness, and greater general appeal in many community settings.
- ▶ A mixture of face-to-face and telephone counselling (especially in follow-up) has shown potential in several research studies but is not yet a widely established practice standard. Telephone schedules tend to be frequent (weekly) at the outset before moving to fortnightly and then becoming less frequent as time goes on – following up at 1 month, then every 3 months, subject to available resources.
- ▶ There is also evidence to suggest that once a physical activity programme has been established, counselling contacts may not need to be frequent.
- ▶ Adherence (getting people with diabetes to keep doing the activities as recommended) is hard to achieve outside of formal class or group settings, so it is very important to (1) provide appropriate advice; (2) provide good supervision; (3) support patients; and (4) keep them motivated.

### *Getting people with diabetes started on physical activity – some precautions and contraindications*

- ▶ **Vigorous physical activity:** Before a person with diabetes undertakes a **vigorous** exercise programme, it is currently recommended that an exercise stress test be performed.[21]
- ▶ An **exercise stress test** is not required when the person with diabetes has no history of coronary artery disease (CAD) and is without symptoms, there is no evidence of peripheral arterial disease (PAD) or cerebrovascular disease and the planned exercise programme is of light- to moderate-intensity. The criteria adapted from the American Heart Association's scientific statement[21] are set out in Table 15.
- ▶ **Hyperglycaemia and physical activity:** When people with type 1 diabetes are deprived of insulin for 12–48 hours and are ketotic, exercise can worsen hyperglycaemia and ketosis; therefore, vigorous activity should be avoided in the presence of ketosis. However, it is not necessary to postpone exercise simply based on hyperglycaemia, provided the patient feels well and urine and/or blood ketones are negative.
- ▶ **Hypoglycaemia and physical activity:** In individuals taking insulin and/or tablets physical activity can cause hypoglycaemia if medication dose or carbohydrate consumption is not altered. For individuals on these therapies, added carbohydrate should be ingested if pre-exercise glucose levels are < 100 mg/dl (5.6 mmol/l). Hypoglycaemia is rare in diabetic individuals who are not treated with insulin or tablets and usually no preventive measures for hypoglycaemia are advised in these cases.
- ▶ **Retinopathy and vigorous physical activity:** In the presence of proliferative diabetic retinopathy (PDR) or severe non-proliferative diabetic retinopathy (NPDR), vigorous aerobic or resistance exercise may be contraindicated because of the risk of triggering vitreous haemorrhage or retinal detachment.
- ▶ **Peripheral neuropathy and weight bearing exercise:** Decreased pain sensation in the extremities increases the risk of skin breakdown and infection and destruction of joints. Non-weightbearing exercise is advisable for people with severe peripheral neuropathy. Research indicates that moderate-intensity walking may not increase the risk of foot ulcers or reulceration in those with peripheral neuropathy. All individuals with peripheral neuropathy should wear proper footwear and examine their feet daily so that any lesions can be detected early. Anyone with a foot injury or open sore should be restricted to non-weightbearing activities.

3. Adapted from the AHA scientific statement on exercise training for type 2 diabetes mellitus: Marwick, T. H., M. D. Hordern, et al. (2009). Exercise training for type 2 diabetes mellitus: impact on cardiovascular risk: a scientific statement from the American Heart Association. *Circulation* 119(25): 3244-3262.

**Table 15: Guidelines for whether to undertake stress testing before exercise training in asymptomatic individuals with type 2 diabetes**

Stress testing NOT necessary (all criteria must be met)	Stress testing recommended (if ≥ 1 of criteria met)
<ul style="list-style-type: none"> <li>▶ No clinical history of CAD</li> <li>▶ Asymptomatic</li> <li>▶ No evidence of PAD or cerebrovascular disease</li> <li>▶ ECG normal</li> <li>▶ Light to moderate exercise programme</li> </ul>	<ul style="list-style-type: none"> <li>▶ History of CAD; no stress test in past 2 years</li> <li>▶ Symptoms of chest discomfort or dyspnoea</li> <li>▶ Clinical or laboratory evidence of PAD or cerebrovascular disease</li> <li>▶ ECG evidence of infarction or ischaemia</li> <li>▶ Vigorous exercise programme</li> </ul>

- ▶ **Previously sedentary:** The patient’s age and previous physical activity level should be considered when commencing a programme. Patients with type 2 diabetes who were previously sedentary should aim to accumulate a minimum energy expenditure equivalent to the Pacific Physical Activity Guidelines for adults; however, higher levels of energy expenditure have the potential to yield greater benefits and should be encouraged in the longer term. People should be encouraged to take it gently to begin with, by taking a 10-minute walk if necessary – ‘short walks are better than no walks’ – and building from there.
- ▶ **Warming up the muscles:** Patients with type 2 diabetes may have reduced circulation, and often this is made worse by poor vascular function or atherosclerosis. A good warm-up promotes blood supply via vasodilation of blood vessels in and around the exercising muscle. Preparation for exercise should also include considerations regarding hydration and foot care.

### 5.3 Healthy lifestyle

#### Learning objectives

After this session, participants will understand the importance and the basics of a healthy lifestyle for people with diabetes. They will be able to:

1. explain the value of following a healthy lifestyle to a person with diabetes;
2. explain the main aspects of a healthy lifestyle; and
3. discuss with the patient how they could modify their lifestyle.

For approximate session timing, refer to the suggested timetable on page 12.

#### Resources

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Copy of ‘Path to a healthier Pacific’ poster
- ▶ PowerPoint slide 29
- ▶ Case study 2 (Appendix 2) – optional

## Key points: Healthy lifestyle

Following a healthy lifestyle is important for everyone. It has been shown to help to prevent many chronic diseases such as heart disease, high blood pressure, cancer and diabetes. Topic 5.1: Dietary management and Topic 5.2: Physical activity and exercise have explored two critical aspects of a healthy lifestyle. Here we revisit these briefly but focus mainly on other aspects of a healthy lifestyle that are important for good general health.

A healthy lifestyle is very important in the prevention of diabetes. In addition, it is important for those individuals who already have diabetes, as it can help to keep them in better general health, reducing their risk of developing diabetes complications and other health problems. Advise people on the following important elements of a healthy lifestyle.

### *Avoid tobacco, drugs and betel nuts*

- ▶ Tobacco is the main cause of lung cancer. Smokers are about 20 times more likely to develop lung cancer than non-smokers.
- ▶ Smoking causes heart disease and strokes; there is no safe amount of tobacco you can smoke.
- ▶ Second-hand smoke is produced from the combination of smoke from the burning end of the cigarette and the smoke breathed out by smokers. When you breathe in second-hand smoke, it is just as if you are smoking. There is no safe amount of second-hand smoke. Breathing in even a little second-hand smoke can be dangerous for your health.
- ▶ As with smoking, there is no safe level of drug use. Drugs such as cocaine, ice and marijuana not only are addictive but also contain chemicals that harm the body.
- ▶ Betel or tobacco chewing is also very dangerous. It leads to a high risk of developing mouth cancers. It also weakens the teeth and gums.

### *Use the Pacific Food Guide to make sure you eat healthily and maintain a healthy weight*

- ▶ Each day eat a variety of foods from the three food groups in the right amounts; over a whole day, a person should eat:
  - **about half** of their foods from the **energy** (starchy) group;
  - **about one third** of their foods from the **protective** (fruits and vegetables) group; and
  - the **remainder** of their foods from the **body-building** (protein) group.
- ▶ Maintain a healthy weight. Body mass index (BMI) is obtained by dividing weight (kilograms) by height squared (metres). You are 'overweight' if your BMI is more than 27.
- ▶ The best ways to lose weight are to:
  - be more physically active ('**Move more**');
  - follow the Pacific Food Guide (eating too many body-building and not enough protective foods can lead to weight gain) ('**Eat well**'); and
  - eat less fat and sugar.

If, after taking all of these steps, a person is not losing weight (and is still overweight), then meal portion size should be reduced ('**Eat less**').

### *Avoid heavy drinking of alcohol and kava*

- ▶ Drinking alcohol is safe in moderation but dangerous in excess.
- ▶ Alcohol is associated with an increased risk of cancer overall, and is a cause of cancer of the mouth, throat, larynx and oesophagus.
- ▶ Alcohol is also a risk factor for other cancers, such as cancer of the stomach, breast, liver and pancreas, and has also been associated with bowel cancer.

- ▶ In relation to unborn and breastfeeding babies, alcohol can enter the blood stream of an unborn child when the mother drinks. In sufficient quantities, particularly in the first few weeks after conception, it can cause foetal alcohol syndrome.
- ▶ Heavy drinking episodes and occasional peak blood alcohol levels can increase the risk of miscarriage, low birthweight, cognitive defects and congenital malformations.
- ▶ If a breastfeeding mother drinks alcohol, it is transferred to her breastmilk and has been associated with sudden infant death syndrome (SIDS).

#### ‘One standard drink’

- ▶ One standard drink contains 10 g of alcohol. Example of standard drinks are:
  - 285 ml full-strength beer or 375 ml light beer (average can);
  - 100 ml wine (small glass); or
  - 30 ml spirit (bar measure).
- ▶ A recent publication of the National Health and Medical Research Council (NHMRC) in Australia provides a useful framework for the Pacific region; it sets out the four guidelines presented in Table 16.[22]
- ▶ It is not a good idea to drink a lot of alcohol at one time as it creates too much work for the liver, which can damage the liver permanently over time. Unfortunately, most alcohol use in the Pacific Island region occurs in heavy drinking sessions. This pattern of use also results in social problems such as violence and accidents.
- ▶ If kava (sakau) is used locally, then it is recommended that it is consumed in moderation only. Drinking in excess can affect working ability and has other social implications.

**Table 16: NHMRC guidelines for drinking alcohol**

Target group	Guideline
Healthy* men and women	1. Drink no more than two standard drinks on any day to reduce the lifetime risk of harm from alcohol-related disease or injury. 2. Drink no more than four standard drinks on a single occasion to reduce the risk of alcohol-related injury arising from that occasion.
Children and young people	3. For children and young people under 18 years of age, <b>not drinking alcohol</b> is the safest option. (Parents and carers should be advised that children under 15 years of age are at the greatest risk of harm from drinking and that for this age group, not drinking alcohol is especially important. For young people aged 15–17 years, the safest option is to delay the initiation of drinking for as long as possible.)
Pregnant and breastfeeding women	4. Maternal alcohol consumption can harm the developing foetus or breastfeeding baby. For women who are pregnant or planning a pregnancy, not drinking is the safest option. For women who are breastfeeding, not drinking is the safest option.

Note:

\* For people with diabetes, this workbook recommends one drink per day or less for adult women and two drinks per day or less for adult men.

#### Drink plenty of clean water

- ▶ About 60 to 70 per cent of your body consists of water. Blood is mostly water, and your muscles, lungs, and brain all contain a lot of water. Your body needs water to regulate body temperature and to provide the means for nutrients to travel to all your organs. Water also transports oxygen to your cells, removes waste, and protects your joints and organs.
- ▶ Twenty per cent of the water you need will probably come from the foods you eat. The rest of the water you need should come from the beverages you drink; water is the best choice.
- ▶ Drink at least six to eight cups (about 2 litres) of water each day. Water really is the best drink.
- ▶ Drinks like tea and coffee make you produce more urine than usual, and your body must replace this fluid. So if you drink lots of tea and coffee, you still need to drink plenty of water.

- ▶ Soft drinks and sugary drinks are not a good way to gain the fluid you need either. The high sugar content can cause unwanted weight gain, or can take the place of more nutritious foods in your diet.
- ▶ It is important that the water is safe to drink. Boil it if necessary.

#### *Be active in everyday living – walk more, cycle more, swim more, sit less*

- ▶ Avoiding long sessions of watching TV or DVDs or on the computer and in general, avoiding sitting for extended periods are very important for preventing obesity and diabetes.[23, 26]
- ▶ Movement helps to keep the body healthy. Anything that makes your body move every day is good – walking, cycling, swimming, gardening or even housework. It does not have to be strenuous activity such as running.
- ▶ One good activity is walking. Walk sometimes instead of taking a bus or driving. Catch up with friends by meeting them for a walk instead of sitting in the house talking. Brisk walking is better than slow walking; slow walking is better than no walking!
- ▶ Build up activity gradually; increase the amounts a little at a time.
- ▶ It is important to do some activity regularly.

#### *Wash hands thoroughly and keep food safe*

- ▶ Before eating anything or touching food, wash your hands. It is easy to pick up germs on your hands from touching doors, objects and animals. Always wash hands after visiting the toilet. Wash hands well and often – with soap if you can. Use running water to wash away all the dirt.
- ▶ Food can easily become unsafe if not looked after. Fresh food is safest. Keep foods cool if possible. Follow the ‘best by’ dates carefully. Be careful, when reheating foods, that they are really hot before serving.

#### *Take time to relax; enjoy time with family and friends*

- ▶ Stress is a normal part of everyday life. It is the way our bodies respond to events that could be a threat. For example, crossing a road can become stressful if a car speeds towards us. Once we sense the danger of the oncoming car, our body releases adrenaline, which speeds up our responses. Our heart beats faster, we breathe more quickly, and we may sweat more or get ‘butterflies’ in our stomach. The brain sends a signal to the body to do something – in this example to run and get out of the way of the vehicle.
- ▶ Most people learn skills to cope with a certain amount of stress. However, if the stress levels are too high or the stress goes on for too long, the body begins to wear out. Stress can contribute to skin rashes, headaches, hair loss, high blood pressure and heart attacks.
- ▶ It is important to try to enjoy some stress-free time regularly. Go for a walk, listen to music on the radio, or talk with friends over a glass of fresh coconut juice.

#### *Pay attention to dental care*

- ▶ Recent studies indicate that oral infections – primarily gum infections – are associated with diabetes, heart disease, stroke and pre-term, low-weight births. To date, there is not enough evidence to conclude that oral infections cause these serious health problems. However, research is under way to determine if the associations are causal or coincidental.[27]
- ▶ Gum infections have been called ‘the sixth complication of diabetes,’ because people with diabetes are more likely to have periodontal disease. Researchers are exploring a possible two-way connection between the conditions to see if treating gum disease improves diabetic control.[27]
- ▶ Recent studies point to an increased risk of heart disease and stroke in people with gum infections; the risk increases with the severity of the oral infection. However, there is not yet enough evidence to establish oral infection as an independent risk factor for heart disease or stroke.[27]
- ▶ Some studies have found that mothers of preterm, low-birthweight infants tend to have more severe gum disease than mothers of normal-birthweight babies. More research is needed to determine if gum infections do indeed contribute to babies being born too soon and too small.[27]

### *What you can do to maintain good oral health*

- ▶ Use a fluoride toothpaste; fluoride's protection against tooth decay works at all ages.
- ▶ Take care of your teeth and gums. Thorough tooth brushing and flossing to reduce dental plaque can prevent gingivitis – the mildest form of gum disease.
- ▶ Avoid tobacco. In addition to the general health risks posed by tobacco, smokers have four times the risk of developing gum disease compared with non-smokers. Tobacco use in any form – cigarettes, pipes and smokeless (spit) tobacco – increases the risk of gum disease, oral and throat cancers, and oral fungal infection (candidiasis). Spit tobacco containing sugar increases the risk of tooth decay.
- ▶ Eat wisely. Adults should avoid snacks full of sugars and starches.
- ▶ Visit the dentist regularly. Check-ups can detect early signs of oral health problems and can lead to treatments that will prevent further damage, and in some cases, reverse the problem. Professional tooth cleaning (prophylaxis) also is important for preventing oral problems, especially when self-care is difficult.
- ▶ Diabetic patients should work to maintain control of their disease. Good diabetes control will help prevent the complications of diabetes, including the increased risk of gum disease.
- ▶ If medications produce a dry mouth, ask your doctor if there are other drugs that can be substituted. If dry mouth cannot be avoided, drink plenty of water, chew sugarless gum, and avoid tobacco and alcohol.

### *Recommendations for mothers*

Keep yourself and your children safe from the dangers of tobacco

- ▶ Babies whose mother smokes during pregnancy are harmed: they have a less healthy birthweight and have a greater risk of infant death and disease.
- ▶ Babies are harmed by second-hand smoke. Tobacco smoke harms babies before and after they are born. Unborn babies are hurt when their mothers smoke or if others smoke around their mothers. Babies also may breathe second-hand smoke after they are born.
- ▶ Babies under 1 year old are in the most danger. Babies whose mothers are around second-hand smoke are more likely to have lower birthweights and to have lung problems.

### *Exclusively breastfeed babies for about the first 6 months; continue some breastfeeding for at least 2 years*

- ▶ Breastmilk is the best food for a baby. For the first 6 months, breastfeed babies exclusively. They need only breastmilk, nothing else (not even water). After 6 months, babies still need breastmilk, but also some other foods. Continue some breastfeeding for at least 2 years.
- ▶ **Artificially fed babies are at greater risk of:**[28]
  - gastro-intestinal infection
  - respiratory infections
  - urinary tract infections
  - ear infections
  - allergic disease (eczema and wheezing)
  - insulin-dependent diabetes mellitus
  - sudden infant death syndrome
  - childhood leukaemia
  - necrotising enterocolitis
- ▶ **Breastfed babies may have better:**[28]
  - neurological development
  - protection against multiple sclerosis
  - protection against acute appendicitis
  - protection against tonsillectomy
  - protection against pre-school obesity

- ▶ Women who have breastfed:[28]
  - are at lower risk of breast cancer;
  - are at lower risk of ovarian cancer;
  - are at lower risk of hip fractures and bone density; and
  - may have better protection against rheumatoid arthritis.

## 5.4 Care of the feet

### *Learning objectives*

After this session, participants will have a general understanding of the underlying causes, management and prevention of diabetic foot problems. They will be able to:

1. explain the basic causes of diabetic foot problems;
2. list common foot problems;
3. discuss foot care, footwear and first aid;
4. demonstrate daily foot care routine;
5. identify the 'high risk foot'; and
6. know when to refer.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Bowl of warm water
- ▶ Soap and soft towel
- ▶ Moisturising cream or oil
- ▶ Flipchart page 'Foot care'

## Key points: Care of the feet

Foot problems are common in people with poorly controlled diabetes because of nerve damage and poor circulation. People with diabetes are more likely than others to get foot ulcers or an infection in their feet, and skin wounds may be slower to heal.

Diabetes foot problems can be prevented. For example, in Viola Hospital, Tonga, lower-limb amputations that are needed because of diabetes have been reduced by up to 60 per cent.

Many people with diabetes, particularly those with poor blood glucose control, will experience some nerve damage, poor circulation and poor wound healing. These complications often affect the lower limbs initially (and the feet first of all). The combination of these problems increases the risk of serious foot infections and damage.

Teaching people with diabetes how to perform regular foot inspection, how to practise foot hygiene and when to seek professional help can prevent most foot problems.

### *Nerve damage*

- ▶ Poor blood glucose control can cause nerve damage.
- ▶ When the nerves in the feet are affected, it causes loss of feeling. Sometimes the feet are completely numb, without any feeling at all, but often the sensation is only mildly reduced so that the person may not know that they have damage.
- ▶ The person who has nerve damage is at risk of damaging their feet and may not feel:
  - something hot burning the skin (e.g. hot ground surfaces, hot water, heaters, sunburn);
  - blisters forming (e.g. from new or poorly fitting shoes);
  - cuts or sores on their feet;
  - sharp or rough objects (e.g. on the ground or inside a shoe);
  - the stubbing of a toe (or damage to the toenail or breaking of the skin);
  - an infection; and/or
  - any area of abnormal pressure on the foot.

### *Poor circulation*

- ▶ Poor blood circulation to the feet (peripheral vascular disease) is caused by narrowing of the arteries (again risk is increased with poor blood glucose control and/or a low level of physical activity), thereby reducing the flow of blood to the feet.
- ▶ The feet may feel cold to the touch sometimes.
- ▶ The poor circulation affects the ability to fight infection and wound healing.

### *How to care for the feet*

- ▶ Teaching people with diabetes to have a daily foot care routine provides them with an important part of their self-care management.
- ▶ Encouraging people with diabetes to get into the habit of looking at, feeling and moisturising their feet will help them to keep their feet healthy and to notice any problems early so that they can be treated before they become serious.
- ▶ Demonstrating the foot care routine reinforces its importance. Key steps of the routine to demonstrate are:
  - sit to carry out foot care;
  - wash and thoroughly dry the feet, including between the toes;
  - inspect the feet, including the nails, between the toes, the top and bottom of the feet and the heels;

- check for blisters, areas of redness, swellings, cracks or cuts, discharge or moist, soggy skin;
- feel the feet to check for any areas of heat, broken skin, dry skin, soreness, calluses or corns;
- apply moisturising cream or oil to all surfaces of the feet, then be careful to wipe between the toes again to help keep the skin in good condition; and
- check inside the shoes for foreign objects and rough surfaces before putting them on.

#### *What to advise if a cut, sore or blister is found*

- ▶ Keep the area clean by rinsing well with clean water.
- ▶ Cover the area with a clean dressing.
- ▶ If an area is swollen, red, bleeding or discharging pus, see a health professional urgently.
- ▶ Inspect the area every day.
- ▶ Find the cause.

#### *Toenail care*

- ▶ Cut the toenails just below the tip of each toe.
- ▶ Ideally, cut straight across the top, filing the corners if they are sharp or digging into the skin.
- ▶ Try to avoid cutting down the sides as this can leave bits of nail that grow into the skin and develop into an infection.

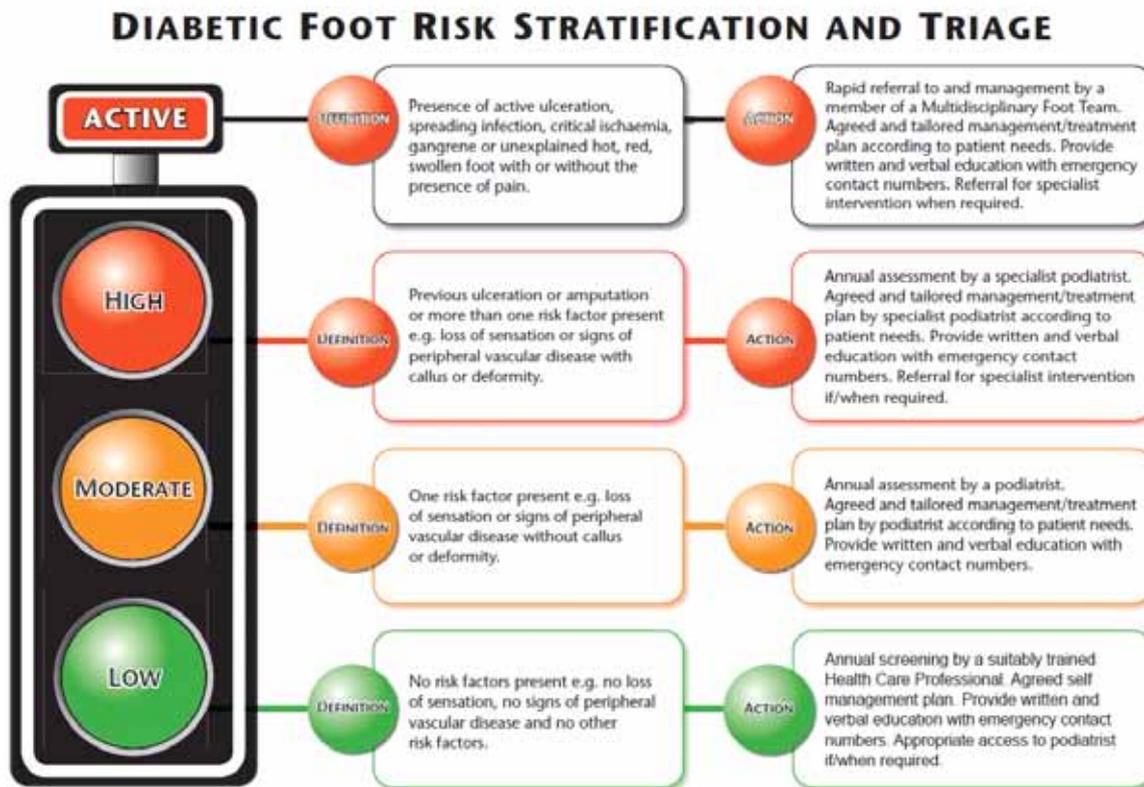
#### *Shoes*

- ▶ It is better for people with diabetes to wear shoes or sandals to protect their feet, especially when they are outdoors.
- ▶ Shoes or sandals must fit well to help prevent ulcers from developing.
- ▶ Rubber soles provide cushioning.
- ▶ It is advisable to wear new shoes for short periods initially to reduce the chance of blisters forming.

*Identification of the 'high-risk foot'*

Figure 11 shows an example of a foot risk stratification and triage tool. A traffic light system is used to indicate the level of risk: green means low, amber moderate and red high risk.

**Figure 11: Identification of the 'high-risk foot'**



Source: SCI-DC Scottish Care Information Diabetes Collaboration Group: Foot risk stratification tool <http://www.diabetesinscotland.org.uk/Publications/traffic%20light%20finalx3.pdf>

## *Learning module 6: Treatment of diabetes – medical management*

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This learning module covers:

- ▶ Topic 6.1: Tablets and insulin
- ▶ Topic 6.2: Hypoglycaemia

For further information on learning objectives, session time and resources, see the specific topics in this learning module.

## 6.1 Tablets and insulin

### *Learning objectives*

After this session, participants will have a basic understanding of insulin and oral hypoglycaemic therapy. They will be able to:

1. describe the actions of the main groups of oral hypoglycaemic agents;
2. list different insulin types based on duration of action; and
3. list factors that affect insulin requirements.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Insulin samples
- ▶ Insulin syringes
- ▶ Flipchart page ‘Management of diabetes’

## Key points: Tablets and insulin

If a healthy diet and physical activity cannot keep blood glucose levels within or close to normal limits, tablets or insulin may be prescribed.

In order to give appropriate advice, it is essential that community health workers understand the recommendations for the administration and safe use of these medications.

**Remember:** Tablets or insulin will not be effective unless used in **combination** with the healthy diet and lifestyle outlined in Learning module 5.

### Tablets for diabetes

- ▶ Tablets are not insulin (and do not contain any insulin).
- ▶ They help the body to produce more insulin and/or help the insulin to work better.
- ▶ They are not a substitute for a healthy diet and physical activity. They are used to increase the effectiveness of these lifestyle changes.
- ▶ They should be taken just before or with meals.
- ▶ The dosage prescribed should be followed carefully.

### Types of tablets

The tablets for diabetes are also known as oral hypoglycaemic agents (OHAs), meaning tablets that you take to lower your blood glucose level.

There are three main types of tablets for diabetes:

1. **Metformin** (also called glucophage) works by helping the body to use the insulin more effectively and by preventing the liver from releasing glucose. If a person is unwell, they should not take their Metformin tablet. Metformin is the medication of choice in the overweight person with type 2 diabetes.
2. **Sulphonylureas** (including gliclazide/diamicron, glipizide, glibenclamide and tolbutamide) work by stimulating the production of insulin. They are the only type of tablets that can potentially cause hypoglycaemia (see Topic 6.2: Hypoglycaemia).
3. **Acarbose** (also known as glucobay) works by delaying the absorption of carbohydrate from the stomach. This tablet can cause some wind or bloating when first taken, but generally these side effects will stop after a few days. It can be given in combination with either of the other types of OHA.

### Possible side effects of tablets

Tablets for diabetes may cause stomach upsets, nausea or diarrhoea. These side effects can be reduced by taking the tablets with meals. Hypoglycaemia and weight gain can be problems with sulphonylureas and repaglinide. Acarbose especially may cause flatulence and diarrhoea. Allergy to a specific medication is a contraindication to its use.

### Prescribing tablets for people with diabetes

Tablets should be prescribed by a doctor or trained diabetes nurse **only**. The type and dosage of tablets should not be modified unless one of these health professionals directs it.

Most people with diabetes can control their diabetes well through diet and lifestyle alone – as long as they follow the advice that they are given.

After the initial diagnosis, a person with diabetes may go through the following stages:

1. They are given diet and lifestyle advice and their progress is monitored.
2. Despite changes to their diet and lifestyle, their blood glucose is poorly controlled so tablets are started.
3. They are monitored regularly to ensure dosage and type are correct. Adjustments are then made until the best regime for that individual is identified.

Generally once a person with diabetes needs to take OHAs, they must use them for the rest of their life. However, many people with diabetes who lose weight can stop taking the tablets (and control their diabetes through diet and lifestyle alone). This result demonstrates how much a healthy lifestyle and weight loss can assist diabetes control.

### *Insulin*

As mentioned above, most people with diabetes control their condition with a healthy diet and lifestyle alone. A very small minority of patients require insulin.

Generally, insulin treatment is not the first form of medication for a person with diabetes; usually they have been treated with tablets for some time first. If monitoring shows that the tablets are failing to control the blood glucose levels, then insulin may be started. In some individuals the OHAs are insufficient to keep their blood glucose at appropriate levels. In others their production of insulin decreases over time so they must move on to insulin injections.

- ▶ Insulin is a hormone that lowers the blood glucose level.
- ▶ Manufactured insulin can only be given by injection and cannot be taken by mouth as it is broken down (digested) in the intestine.
- ▶ Insulin must be balanced by eating carbohydrate food regularly.
- ▶ People with diabetes must also follow dietary and lifestyle advice when using insulin.
- ▶ Insulin is generally given up to half an hour before meals and sometimes before bed.

### *Types of insulin*

- ▶ The type of insulin can be described by its properties – onset of action, peak of action and duration of action.
- ▶ Insulin is either clear or cloudy in appearance.
- ▶ Types of insulin available are:
  - **short acting** – quick onset and short action;
  - **intermediate acting** – relatively slow onset and intermediate action;
  - **premixed** (short and intermediate) – quick onset and intermediate action; and
  - **long acting** – slow onset and long action.

### Prescribing insulin

- ▶ Figure 12 presents a flow-chart for prescribing medication for type 2 diabetes and identifies how some kinds of non-diabetes medication affect blood glucose levels.
- ▶ Insulin dosage and type are decided by the doctor and should not be adjusted without advice from them.
- ▶ Insulin treatment aims to copy the insulin pattern in a person without diabetes. That is, it allows the person with diabetes to have a small amount of insulin at all times and more after meals when blood glucose levels would otherwise rise.
- ▶ The dosage and type need to be individually tailored for each person. Initially there may be a number of changes in dosage while the health professional is monitoring the blood glucose level frequently in order to find the best regime.

### Insulin delivery – some important facts

- ▶ Insulin injections should be subcutaneous. Sites for insulin injections are:
  - ✓ abdominal wall – generally fastest and the most uniform rate of absorption; and
  - ✓ legs – slower absorption (unless exercising); an acceptable site.
  - ☒ Arms are **not recommended**.
- ▶ The following are possible insulin delivery mechanisms:
  - **Syringes** are the most commonly used device for delivering insulin. Patients often reuse syringes but in situations where injections are given by visiting nursing staff, single use only is recommended. People can dispose of sharps (blood-letting lancets, syringes etc.) in an approved sharps disposal container.
  - **Insulin pens** are rather like large fountain pens with a cartridge of insulin inserted like an ink cartridge. They make giving injections much simpler because drawing up is unnecessary. With insulin injectors, multiple daily injection schedules become much easier and people can be more flexible in their self-management.
  - **Insulin pumps** are used by some people with type 2 diabetes. The pump is attached to the person's clothing and infuses very short-acting insulin at variable rates into the subcutaneous tissues through an infusion set. Insulin pumps can be programmed to provide variable basal insulin infusion rates throughout the day and can also provide preprandial doses of bolus insulin.

### What affects insulin requirements?

An individual's insulin requirements may be affected by:

- ▶ poor diet
- ▶ lack of physical activity or exercise
- ▶ stress
- ▶ infection or illness
- ▶ hormonal changes

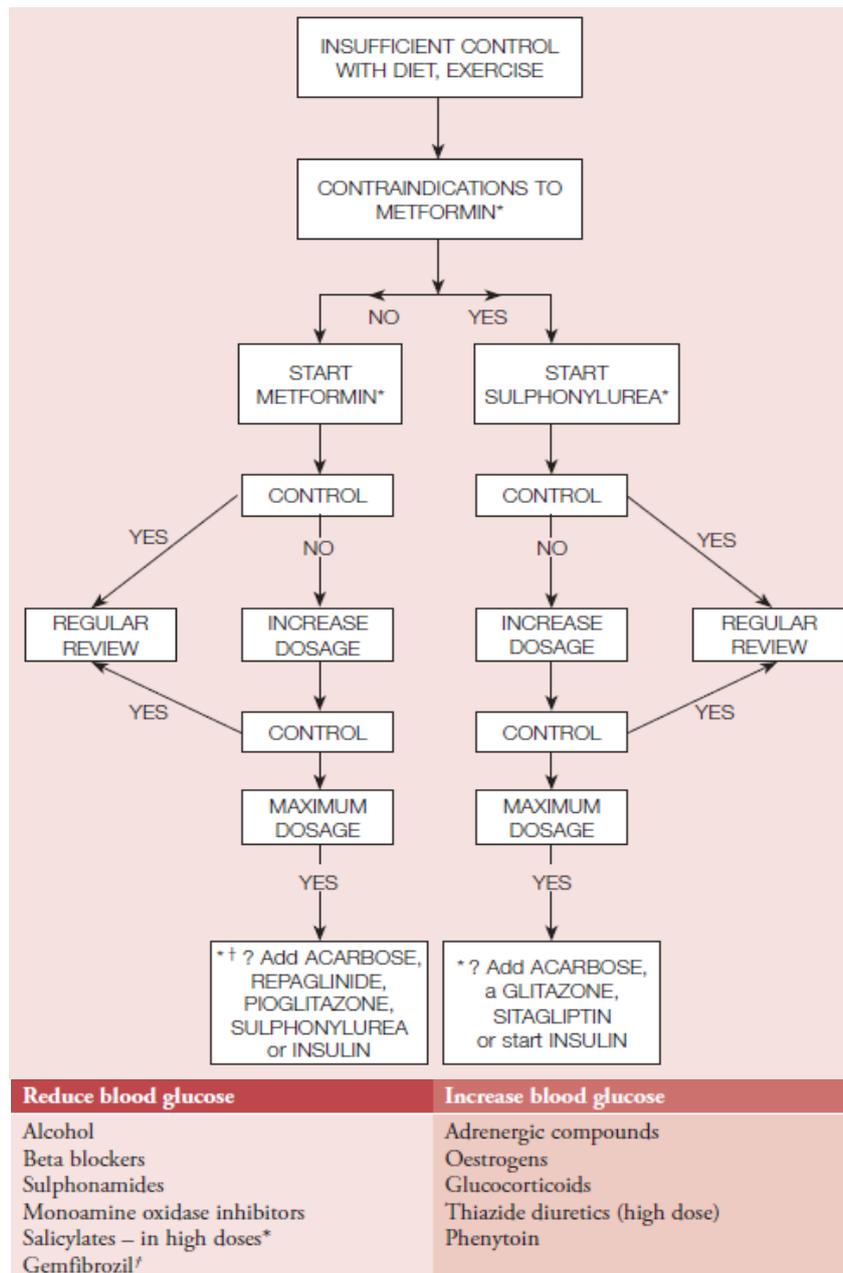
That is, any of the above can result in abnormal blood glucose levels.

A doctor or trained diabetes nurse can help to assess and interpret blood glucose results.

It is very important for anyone using insulin to have their blood glucose level assessed regularly. With regular checks, any problems such as over- or under-dosage can be dealt with quickly.

Patients who have been using insulin for a long time may learn to alter their insulin dosage based on their activity. However, making such adjustments correctly takes a lot of experience and this approach is not recommended for patients who have just begun taking insulin

**Figure 12: Medication flow-chart for type 2 diabetes and the effects of non-diabetes medication on blood glucose levels**



Source: Diabetes Australia and RACGP[13]

## 6.2 Hypoglycaemia

### *Learning objectives*

After this session, participants will be aware of the significance of hypoglycaemia for people with diabetes. They will be able to:

1. define hypoglycaemia;
2. describe the symptoms of hypoglycaemia;
3. list the causes of hypoglycaemia;
4. outline the treatment for hypoglycaemia; and
5. suggest strategies for avoiding hypoglycaemia.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Case study 1 (Appendix 2)

## Key points: Hypoglycaemia

Most people with diabetes **do not experience** hypoglycaemia (commonly called hypo) – that is, low blood glucose levels. It tends to be an acute short-term complication that results from diabetes **treatment**. (Only those receiving insulin or a certain type of tablet can develop low blood glucose levels.) See Appendix 6 for a summary of these guidelines on hypoglycaemia.

### *What is hypoglycaemia?*

Hypoglycaemia is:

- ▶ a low blood glucose level, below the normal range – that is less than 4 mmol/L (70 mg/dl) or if the person is feeling symptoms of hypoglycaemia (see below);
- ▶ an acute, short-term complication of diabetes treatment; and
- ▶ an indication of poor diabetes control or a health problem (such as an infection).

### *Why is hypoglycaemia a problem?*

If hypoglycaemia is left untreated, it can lead to problems including:

- ▶ falls and injury
- ▶ unconsciousness
- ▶ fitting

### *Causes of hypoglycaemia*

It is mostly people using insulin who are risk of having a ‘hypo’. Remember that only people using insulin injections or taking sulphonylurea tablets (including gliclazide/diamicron, gliplizide/glipid, glibenclamide/gliben and tolbutamide/diatol) can develop a hypo.

Potential causes of a hypo are:

- ▶ missing or delaying a meal;
- ▶ not eating enough carbohydrate (starchy or sugary);
- ▶ doing a lot of physical activity without eating enough carbohydrate;
- ▶ taking too much medication; and
- ▶ drinking too much alcohol or drinking alcohol without carbohydrate food.

### *Symptoms of hypoglycaemia*

A person with hypoglycaemia may experience one or more of the following symptoms:

- ▶ cold sweat
- ▶ tremor
- ▶ tingling in the lips or mouth
- ▶ palpitations
- ▶ pounding headache
- ▶ feeling faint or hungry
- ▶ light headedness
- ▶ irritability
- ▶ confusion
- ▶ decreased or loss of consciousness
- ▶ blurred vision
- ▶ lack of concentration
- ▶ aggressive behaviour

**Note:** Some people may not experience any symptoms when they have a hypo.

A common problem is that people with diabetes can overdiagnose themselves as having a hypo when they are not. In particular, many people with diabetes may think they can get a hypo (because they have heard about the condition from other people with diabetes) when they are not at any risk as they are not on insulin or one of the sulphonylurea drugs. Where someone is at risk – that is, they are taking insulin or one of the sulphonylurea drugs – and thinks they are having a hypo, ideally they should test their blood glucose level to see if it is too low.

It is important to explain hypoglycaemia to every person with diabetes, whether or not they are at risk of having a hypo:

- ▶ To those who are not at risk, explain clearly that they are not at risk.
- ▶ To those who are at risk, explain the symptoms, prevention and treatment of hypoglycaemia. It is also important to speak to the patient's family so that they can recognise the symptoms and know the treatment required. Sometimes the patient may become unwell quite quickly and may need help to deal with it.

#### *How to treat hypoglycaemia*

- ▶ Take some quickly absorbed carbohydrate (e.g. sugar, jam, a glass of sweet drink such as cola or lemonade, or a couple of boiled sweets).
- ▶ Follow this with some slowly absorbed carbohydrate (e.g. bread, a glass of milk or some crackers or biscuits). If close to meal time, have the meal with the usual amount of carbohydrate.
- ▶ Identify the cause to prevent further episodes.

#### *How to avoid hypoglycaemia*

Hypoglycaemic episodes should be avoided as much as possible. Anyone experiencing hypos on a regular basis needs their medication and lifestyle carefully reviewed. Hypos should be rare.

Offer the following **advice to any patient experiencing frequent hypos:**

- ▶ Do not miss meals.
- ▶ Eat some starchy carbohydrate (energy food group) food at every meal.
- ▶ If doing strenuous exercise, have some extra carbohydrate food before and/or during that exercise.
- ▶ Do not drink alcohol without eating some starchy carbohydrate food as well.
- ▶ If having frequent episodes of hypoglycaemia, see the doctor for a review of diabetes medication as it may need to be reduced or changed.

# Learning module 7:

## Stop the problem before it starts – prevention

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This learning module covers:

- ▶ Topic 7.1: Type 2 diabetes is largely preventable
- ▶ Topic 7.2: Who should take preventive action?
- ▶ Topic 7.3: How can diabetes be prevented?

### Learning objectives

After this session, participants will have a basic understanding of the prevention of diabetes and its importance. They will be able to:

1. summarise the main scientific evidence that type 2 diabetes is largely preventable;
2. give the main reasons why efforts are needed to prevent diabetes;
3. explain which groups and individuals are most at risk of developing diabetes; and
4. detail the main lifestyle changes that can prevent or delay diabetes.

For approximate session timing, refer to the suggested timetable on page 12.

### Resources

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Flipchart page ‘Prevention of diabetes’

### Cross refer to:

- ▶ Learning module 5: Patient and family education
  - Topic 5.1: Dietary management
  - Topic 5.2: Physical activity
  - Topic 5.3: Healthy lifestyle

## Key points: Preventing diabetes

Rates of diabetes are increasing both internationally and in the Pacific Island region. Of particular concern in our region is that the onset of diabetes occurs at a significantly lower age than in many other countries. This trend is worrying as the risk of complications is affected not only by how good the diabetes control and lifestyle are, but also by how long someone has been diabetic – the more years of diabetes, the higher the risk of complications.

### 7.1 Type 2 diabetes is largely preventable

- ▶ There is now very good evidence for the efficacy of interventions to prevent and delay type 2 diabetes. Randomised controlled trials have shown that individuals at high risk of developing diabetes (those with IFG, IGT, or both) can be given interventions that significantly decrease the rate of onset of diabetes.[39]
- ▶ These interventions include intensive lifestyle modification programmes that have been shown to be very effective (58 per cent reduction after 3 years) and use of drugs such as Metformin, which has been shown to decrease incident diabetes.
- ▶ Two important studies of lifestyle intervention have shown persistent reduction in the rate of conversion to type 2 diabetes; one study used 3 years of follow-up after intervention[10] and the other went even further, following up 14 years after the intervention.[11]

### Systematic reviews of the evidence

In addition to the **individual** scientific reviews previously cited in the workbook, we now look at several published 'systematic reviews'. A systematic literature review is a means of identifying, evaluating and interpreting **all available high quality research** relevant to a particular question: in this case the prevention of type 2 diabetes (see Glossary for more details). Recent systematic reviews offer the following conclusions:<sup>4</sup>

- ▶ A low-GI diet can improve glycaemic control in diabetes without compromising hypoglycaemic events.[29]. Overweight or obese people on a low-GI or low glycaemic load diet lost more weight and had more improvement in lipid profiles than those receiving higher-GI or other diets. A low-GI diet appears to be an effective method of promoting weight loss and improving lipid profiles and can be incorporated simply into a person's lifestyle.[30]
- ▶ Exercise improves blood sugar control and this effect is evident even without weight loss. Furthermore, exercise decreases body fat content, thus the failure to lose weight with exercise programmes is probably explained by the conversion of fat to muscle.[31]
- ▶ Interventions aimed at increasing exercise combined with diet are able to decrease the incidence of type 2 diabetes mellitus in high-risk groups (people with impaired glucose tolerance or the metabolic syndrome).[32]
- ▶ People who are overweight or obese benefit from psychological interventions, particularly behavioural and cognitive-behavioural strategies, to enhance weight reduction. They are predominantly useful when combined with dietary and exercise strategies.[33]
- ▶ There is an absence of evidence of sufficient quality (at the standard of systematic review level) to determine whether wholegrain foods can assist in the prevention of type 2 diabetes mellitus.[34]
- ▶ There are no high-quality data on the efficacy of dietary intervention (i.e. diet only intervention, systematic review level standard) either for the prevention or for the treatment of type 2 diabetes.[35]

4. Note that a very strict level of evidence is required for Cochrane-style systematic reviews and that single or small numbers of positive studies are unlikely to constitute 'sufficient evidence'.

- ▶ Supplementation with omega-3 polyunsaturated fatty acids (PUFA) in type 2 diabetes lowers triglycerides and VLDL cholesterol, but may raise LDL cholesterol (although results were non-significant in subgroups) and has no statistically significant effect on glycaemic control or fasting insulin. Thus more high-quality studies are needed to establish conclusively the role of omega-3 PUFA in type 2 diabetes. However, available evidence does not suggest a major harmful effect on the balance of blood fats and confirms that it has no adverse effect on blood sugar control.[36]

### 7.2 Who should take preventive action?

- ▶ Anyone at risk of developing diabetes would benefit from adopting a healthy lifestyle as they could prevent diabetes from developing, or at least delay it by years. Because the risk of complications increases the longer a person has diabetes, it is obviously beneficial to keep the number of years as a diabetic to the fewest possible.
- ▶ In terms of health-care costs, even people who have diabetes without complications require special health-care services and monitoring. Therefore reducing the number of people with diabetes also has clear financial benefits.

#### **People at increased risk of developing diabetes are:**

- ▶ individuals who are overweight or obese;
- ▶ over 30 years of age (if Pacific Islanders);
- ▶ individuals with a family history of diabetes (close family member);
- ▶ Pacific Islanders (genetic risk);
- ▶ individuals with an unhealthy diet;
- ▶ individuals with a low level of physical activity; and/or
- ▶ women who have previously had gestational diabetes.

While it would be ideal for everyone to follow the accepted advice on lifestyle to reduce their risk of developing diabetes, it is particularly important for people at high risk – that is, those to whom two or more of the above factors apply – to do so. Unfortunately a number of these risk factors are very common in our region.

### 7.3 How can diabetes be prevented?

- ▶ Individuals at high risk of developing type 2 diabetes can reduce the risk by following structured programmes emphasising lifestyle changes, which include moderate weight loss (7 per cent body weight), regular physical activity (150 minutes a week) and dietary strategies such as reduced calories and reduced intake of dietary fat. Such programmes are therefore recommended.
- ▶ Individuals at high risk of developing type 2 diabetes should be encouraged to achieve the recommendation for dietary fibre (14 g fibre/1000 kcal) and foods containing whole grains (one-half of grain intake).
- ▶ The recommendations for the control of diabetes and its prevention are virtually the same. Essentially, prevention of diabetes involves following a healthy lifestyle by:
  - losing weight if overweight, and avoiding unwanted weight gain;
  - having a healthy, balanced diet – reducing fat, sugar and salt intake and increasing fruit and vegetable intake;
  - undertaking daily physical activity;
  - avoiding tobacco, drugs and betel/areca nut;
  - drinking alcohol and kava in moderation only;
  - reducing stress; and
  - drinking plenty of clean, safe water.

For more information, see Topics 5.1–5.3 in Learning module 5.

#### *Promoting increased participation in physical activity*

- ▶ The Pacific Physical Activity Guidelines for Adults are relevant for all healthy adults aged 18–65 years with no contraindication to physical activity. The guidelines also apply to individuals in this age range with chronic conditions not related to mobility such as asthma, hay fever, hypertension and hearing impairments.
- ▶ Pregnant, postpartum women and people with a history of cardiac events may need to take extra precautions and seek medical advice before starting on a vigorous physical activity regime as indicated in the guidelines.

**Table 17: Pacific physical activity guidelines for healthy adults aged 18–65 years (expanded)**

**Physical activity Guideline 1:** If you are not physically active (not moving much), it's not too late to **start now!** Do regular physical activity and reduce sedentary activities.

**How to explain Guideline 1 to the community:**

It is easy to start adding some movement into your everyday living. If you are not currently active you can begin by adding a few minutes (less than 10 minutes' duration) of moderate-intensity physical activity each day, such as walking and doing more tasks around the house, walking to the corner store or a nearby park or beach.

**Physical activity Guideline 2:** Be active every day in as many ways as you can, your way.

**How to explain Guideline 2 to the community:**

Physical activity can be part of the routine activities of day-to-day living, such as farming, gardening, walking or cycling to work, walking to catch a bus, house cleaning, or doing household chores. Any movement of the body done through these activities every day is an opportunity to improve health, and is not a waste of time and energy. Walking or cycling to the shop nearby instead of taking the car, using the stairs, and walking to the office next door instead of sending an email or phoning, are examples of being active in a variety of ways.

**Physical activity Guideline 3:** Do at least 30 minutes of moderate-intensity activity on 5 or more days each week.

**How to explain Guideline 3 to the community:**

Moderate-intensity physical activity means working hard enough to increase your breathing and heart rate, yet still being able to talk comfortably but not sing. The risk of musculoskeletal injuries, myocardial infarction or sudden cardiac event is low in generally healthy adults during moderate-intensity activities. A good example of moderate-intensity activity is brisk walking (walking as fast as you can and still being able to talk but not sing). Other examples are digging in the garden, playing volleyball, or medium-paced swimming or cycling.

The average healthy adult needs to do a minimum of 30 minutes of activity every day to reduce risk of noncommunicable disease and maintain health. The amount of activity can be built up throughout the day in sessions of 10–15 minutes each. But remember, accumulating more than 30 minutes of physical activity is better, and you should enjoy a variety of activities. **Note that approximately 60–90 minutes of moderate-intensity physical activity per day may be necessary to lose weight or maintain weight loss.**

**Physical activity Guideline 4:** If you can, enjoy some regular vigorous-intensity activity for extra health and fitness benefits.

**How to explain Guideline 4 to the community:**

This guideline does not replace Guidelines 1–3. Rather it adds an extra level for those who are able, and wish to achieve greater health and fitness benefits. How hard is vigorous? 'Vigorous' activity causes a large increase in breathing and heart rate. It makes you 'huff and puff' so that, for example, talking in full sentences between breaths is difficult. Vigorous activity can come from sports, such as football, volleyball and basketball and from other activities, such as aerobics, jogging and fast cycling. For best results, this type of activity should be carried out for a minimum of around 20 minutes a day, 3 days each week. However, individuals can combine Guidelines 3 and 4 by walking briskly for at least 30 minutes twice each week and then playing some outdoor sports for at least 20 minutes on 2 other days, which would also meet the overall public health guidelines.

### *How can the community support individuals to follow a healthy lifestyle?*

- ▶ While each individual has to take responsibility for their own health and lifestyle, the support of family and friends is essential. Support can encourage the individual and reinforce the value of a healthy lifestyle.
- ▶ In addition, a healthy community can provide wider support to the individual. A health-promoting environment can support the individual by making available local foods, safe places for walking, and no smoking areas, as well as providing legislation to control drugs and alcohol.
- ▶ As we all know, making lifestyle changes is challenging. There is pressure to join in during feasts, to have one more drink with friends or to take the car instead of walking. It is important to appreciate how hard it is for someone to change lifelong habits.
- ▶ There are many ways of encouraging people to change such as by:
  - developing supportive groups or communities;
  - working with the whole family group;
  - frequently reinforcing and praising efforts; and
  - discussing any issues and concerns related to lifestyle change and making/ or revising goals and plans.

## *Learning module 8: What should your role be?*

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This learning module covers:

- ▶ Topic 8.1: Community and patient education
- ▶ Topic 8.2: Supportive environments and supportive people

For further information on learning objectives, session time and resources, see the specific topics in this learning module.

## *8.1 Community and patient education*

### *Learning objectives*

After this session, participants will understand the importance of developing a planned approach to diabetes education. They will be able to:

1. consider factors that may affect any person's ability to learn new information and skills;
2. outline additional factors that may affect the learning of a person with diabetes;
3. list strategies to create an effective learning environment; and
4. outline essential points in diabetes education.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Role play (Appendix 3)

## Key points: Community and patient education

Diabetes control is primarily up to the patient; it essentially involves self-management. Even though the doctor, nurse and community health worker provide medical treatment, people with diabetes are expected to take responsibility for a whole range of self-care practices, like their diet and lifestyle, and for attending the clinic for regular checks. In order to take part in their diabetes management and follow self-care recommendations, people with diabetes need a basic knowledge of the nature of diabetes.

### *The role of community education*

Education and awareness-raising among the general population are vital elements in the fight against diabetes.

Educating the community will help to:

- ▶ empower individuals to adopt healthy lifestyles;
- ▶ change the environment to support healthier lifestyles; and
- ▶ support the diagnosis of diabetes in individuals at an early stage in its development.

### *The role of patient education*

Patient education in diabetes care is now seen as essential. It is supported by evidence of effectiveness in helping to improve health outcomes and health-related quality of life. People with diabetes must take control of their own health and lifestyle. To do so requires knowledge, skills and motivation.

All health professionals need to be able to:

- ▶ assess, reassure and advise people with diabetes; and
- ▶ provide ongoing support and motivation to help them manage their condition and lead full and active lives.

Most patients should have received some advice when they were first diagnosed at the health-care centre. However, often the shock of the diagnosis can make it difficult for them to remember this information. Therefore education should start from basics once they return to their community. For some patients the community health worker may be expected to deal with all diabetes education anyway. When teaching in either situation, it is best to first find out what the patient knows, what they want to know and what they are confused about, then to use this information to decide what to teach them.

### *Planning self-care education*

- ▶ A planned approach to education is needed to ensure that important topics are given priority and all relevant information is covered.
- ▶ Barriers to education include:
  - difficulty with accepting that they have diabetes (responses may include shock/denial, grief, anger, bargaining, acceptance);
  - culture;
  - attitude to illness;
  - limited cognitive ability;
  - limited dexterity or mobility;
  - problems with sight;
  - problems with hearing;
  - problems with literacy;
  - living or working arrangements;
  - financial situation; and
  - co-existing illnesses.

### *A supportive environment*

The environment is an essential component of diabetes care. Features of a supportive environment include:

- ▶ easy access to affordable, healthier food options in stores, markets and restaurants;
- ▶ access to safe places and amenities to be more physically active (walkways, cycle paths, safe swimming);
- ▶ responsible serving of alcohol; and
- ▶ smoke-free places.

Widespread support is also essential to address issues such as feasting, where even the person with diabetes may feel compelled to overeat so as not to offend their hosts, and social stigma that may be attached to being seen walking.

### *Empowering through education*

- ▶ Providing diabetes education empowers people with diabetes so they are able to make informed choices about the management of their diabetes.
- ▶ An empowered person with diabetes has:
  - a broad knowledge of diabetes, its complications and treatment;
  - appropriate self-care skills;
  - resources to provide self-care;
  - a positive view of their health and their condition;
  - a feeling of control over their health.

### *The learning environment*

Education should take place in an environment that is favourable to learning. People learn best:

- ▶ in a safe, non-threatening environment;
- ▶ when they have the opportunity to practise;
- ▶ when the educator has a non-judgemental approach.

There is a range of ways to create a positive learning environment. The following factors are important when creating a positive learning environment for people with diabetes in particular.

### *Take the time to make an assessment*

Each patient should carefully be assessed to see if they:

- ▶ can hear what you are saying to them;
- ▶ can see what you are showing them;
- ▶ can understand and follow self-care recommendations;
- ▶ can read any information;
- ▶ have dexterity problems (e.g. arthritis) that may make it difficult for them to administer medication or foot care;
- ▶ have problems that prevent them from eating regular meals (e.g. being unable to shop or cook for themselves or having bad teeth);
- ▶ can be physically active; and/or
- ▶ can carry out basic foot care.

### Recognise that each patient is different

- ▶ Learning that they have been diagnosed with diabetes may have a great impact on the individual patient. Being asked to alter habits from a lifestyle that they have followed for many years may lead to stress, anger, denial and resentment. Many newly diagnosed diabetics know friends or relatives who have suffered many of the complications of diabetes, and so they see diabetes as frightening and dangerous.
- ▶ The diagnosis may have been missed or delayed because the patient did not show the classical symptoms, so complications may already be present.
- ▶ A patient may have several co-existing chronic conditions requiring several different medications which may interfere with diabetes management.
- ▶ The patient's ability for self-care can be hindered by decreased attention, vision, hearing, dexterity and/or mobility.

### Give reassurance

- ▶ Correct any wrong information or mistaken beliefs that your patient may have, and give reassurance.
- ▶ Emphasise that diabetes is not anyone's fault.
- ▶ Assure the patient that diabetes can be successfully managed.

### Give information effectively

- ▶ Plan your education sessions so that you give all relevant information to the patient.
- ▶ Modify the information for each individual.
- ▶ Give only essential information at the first meeting. Focus on dealing with any areas of confusion or concern for the patient. You may also need to deal with the basics of diet and medication.
- ▶ Cover general information and detailed advice about diet and lifestyle at later meetings. (You need to be sure that you can see the patient again, and regularly.)
- ▶ Give up-to-date information.

### Involve carers or immediate family

Although each individual has to take responsibility for their own health and lifestyle, the support of their family is essential. This support can encourage them and reinforce the importance of a healthy lifestyle. In addition if someone other than the person with diabetes is doing the cooking, shopping or gardening, that person must be aware of the needs of the patient.

It is therefore often useful to include the key individuals who support the patient in at least one of the education sessions. (Including them works well in a group situation also.)

### Use a structured approach and have your discussion points ready

Below are some trigger questions that can be used to start discussions with patients:

- ▶ What do you know about diabetes?
- ▶ What concerns or questions about diabetes do you have?
- ▶ How do you feel about the diagnosis?
- ▶ How did your family react?
- ▶ Who else do you know with diabetes? Tell me about their health.
- ▶ What do you think will be the most difficult thing about having diabetes?

### *What do people with diabetes need to know?*

People with diabetes need to know:

- ▶ diabetes is serious;
- ▶ they did not get diabetes as a result of doing one particular thing (e.g. eating sugar);
- ▶ diabetes can be controlled;
- ▶ complications are not inevitable – a full and healthy life is possible;
- ▶ what diabetes is;
- ▶ the basics of treatment;
- ▶ recommendations on how to avoid long-term complications;
- ▶ dietary advice;
- ▶ physical activity advice;
- ▶ lifestyle advice;
- ▶ how and when to take medications;
- ▶ how to look after their feet;
- ▶ where to get support;
- ▶ the importance of having regular medical checks; and
- ▶ when to seek professional help.

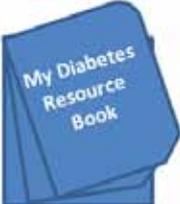
### *Structuring an education session*

- ▶ Plan a series of sessions with each patient – perhaps to be held every day or every few days.
- ▶ Build up the information gradually.
- ▶ Don't overload the patient with too many facts at once. Could you remember 20 new things told to you in 10 minutes?
- ▶ Tailor information to each patient. Don't just give them 'standard' information.
- ▶ Use handouts as memory prompts. Include handwritten notes to explain specific items. (They can't remember everything you discuss in every session.)
- ▶ Ask if they understand and if they have any questions. Don't assume that nodding means they have understood everything.
- ▶ Test their understanding with some simple questions. For example: 'So what things will you be doing differently tonight?' 'So what will you do if someone offers you a piece of cake?'
- ▶ At the next session, check that the patient has followed the advice from last time, and ask what problems they encountered.

- ▶ **Homework** is a key activity that helps participants to **both** revise learning material and to develop their own succinct set of resources, based on the Participant's Workbook.
- Guided by the PowerPoint slide below, participants do the following homework task: use the workbook to develop your own resource: 'What do people with diabetes need to know? Cover all of the points shown on the checklist.'

**HOMEWORK:** Use the participant manual to develop your own resource: "what do people with diabetes need to know?" Make sure to cover all of these points:

- ✓ Diabetes is serious;
- ✓ Diabetes can be controlled;
- ✓ People do not get diabetes as a result of doing any 'one particular thing';
- ✓ Complications are not inevitable — a full and healthy life is possible;
- ✓ What diabetes is/ the basics of treatment;
- ✓ Recommendations on how to avoid long-term complications;
- ✓ Dietary, physical activity, lifestyle advice;
- ✓ How and when to take medications;
- ✓ How to look after their feet;
- ✓ Where to get support;
- ✓ The importance of having regular medical checks;
- ✓ When to seek professional help.



## *8.2 Supportive environments and supportive people*

### *Learning objectives*

From this session, participants will have had the opportunity to:

1. distinguish between the issues and risk factors (political, social and environmental) impacting on people's health that it is possible to influence and those issues that are much more difficult to affect;
2. identify local issues, problems and barriers that the participants may be able to influence;
3. discuss and agree on some strategies that they can develop and/or use to make changes; and
4. explore the concept of what they can do personally.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources*

- ▶ Refer to Table 1 for information on PowerPoint presentations that support each module – page 2
- ▶ Board and chalk/marker pens

## Key points: Supportive environments and supportive people

### *Supportive environments*

While it is vital to educate people with diabetes, the environment in which they live also has an important role in their diabetes management. A healthy environment makes it easier for people to lead a healthier lifestyle that prevents or manages diabetes.

Consider these examples of how the environment can affect a person's health:

- ▶ One person goes out for a meal and wishes to choose a healthy meal but the menu offers no such options.
- ▶ Another person wishes to avoid smoking but has to work in a smoky environment.

Although individuals have a huge role to play in ensuring that they lead a healthy lifestyle, a supportive environment helps to make such a lifestyle the easy choice. Otherwise, to make the healthy choice in the above examples, the first person must go home to eat and the second person must change job!

Changing the environment is not an easy task. It requires action by many people. Community health workers are ideal people to push for such change, and to help to motivate the community to change also.

### *Supportive people: professional and personal roles*

Diabetes can be prevented. All community health workers have a major role in increasing public awareness about the risk factors for developing diabetes and the healthy lifestyle that can prevent it. They can:

- ▶ promote awareness of the risk factors;
- ▶ encourage people to discuss the issues with their doctor or health worker if they have risk factors;
- ▶ encourage healthy eating habits in those at risk and in the general population;
- ▶ encourage overweight people to lose weight;
- ▶ encourage regular physical activity for all and in particular for those at risk;
- ▶ promote a healthy lifestyle for all and in particular for those at risk;
- ▶ be a role model by leading a healthy lifestyle themselves;
- ▶ ensure that other health services are aware of diabetes as a health problem and are aware of the services available for people with diabetes; and
- ▶ increase awareness of the symptoms of diabetes.

### **Community health workers should:**

- ▶ take every opportunity to increase awareness of diabetes and promote a healthy lifestyle in the community;
- ▶ provide information to people with diabetes and their families, and promote healthy lifestyle practices; and
- ▶ ensure that their skills and knowledge are accurate and up to date.

## *Learning module 9: Mock sessions*

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### *Learning objectives*

From this session, participants will have had the opportunity to:

1. experience delivering advice on diabetes prevention or control to a community; and
2. learn from other participants' talks.

For approximate session timing, refer to the suggested timetable on page 12.

### *Resources for participants*

Participants should use the information that they have learnt so far, any of the materials presented in this workshop and a lot of imagination!

# Appendix 1:

## Effective adult learning practices

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### *The principles of adult learning*

Being an effective facilitator or teacher in the community involves understanding how adults learn best. Theories of adult learning include the following ideas and principles:

- ▶ **Purposeful:** Adults like to know why they should learn something before investing time in a learning activity. Facilitators must ensure that the learners know the purpose of training as early as possible.
- ▶ **Self-directed:** Adults tend to see themselves as self-directing, responsible grown-ups. Facilitators must take account of this viewpoint by helping adults to identify their own needs and direct their own learning experience as much as possible.
- ▶ **Participatory and experience based:** Adults participating in training programmes bring with them a wealth of experience and a great deal to contribute. Facilitators are more successful when they identify ways to build on and make use of adult participants' experience.
- ▶ **Relevant and problem-solving:** Adults tend to respond well to learning experiences that help them cope with daily work responsibilities effectively. They are willing to devote energy to learning those things that they believe help them perform a relevant task or solve a relevant problem. Facilitators who take the time to find out the needs and interests of participants and to develop content in response to these needs are most helpful to adult learners.
- ▶ **Self-assessment oriented:** Adult learning is given a boost when individual participants are encouraged to assess their own knowledge and skills in order to discover gaps or limitations for themselves.

### *Four tips for a successful training event*

You cannot always guarantee 100 per cent success in training events but some factors will make it more likely that things will go well! Four important tips for success are to:

1. create a safe place for learning;
2. make the learning environment comfortable;
3. encourage active participation; and
4. facilitate more than you lecture.

Each of these tips is illustrated below with some practical examples.

#### *Tip 1: Create a safe place for learning – some examples*

- ▶ Be at the venue early enough so that you can greet participants at the door, welcome them, learn their names, and allow time for them to tell you something that's important to them.
- ▶ Use name badges and warm-up activities to familiarise the participants with one another.
- ▶ Share the objectives of the training programme early, ahead of the session, if possible.
- ▶ Explain to participants how they can benefit from the information and learning experiences in the programme.
- ▶ Demonstrate your respect for each individual.
- ▶ Use participants' names.
- ▶ Be clear about whether any parts of the training involve confidentiality and remind participants of this principle at the appropriate points in the programme, ('For the next exercise, whatever you discuss in your small groups or in the large group is confidential – does everybody understand and agree to this?')

#### *Tip 2: Make the learning environment comfortable – some examples*

- ▶ Make sure the room has appropriate lighting and find out how to adjust the lights; turn the lights on brightly for the start of the session.
- ▶ Get a room with natural light if possible.
- ▶ Find out how to adjust the thermostat of heating or air conditioning units to the most comfortable level for most of the participants.
- ▶ Hide unnecessary items such as boxes and materials not needed till later. Arrange chairs neatly in the pattern most suitable for the start of the event. This tidiness sends the message that you took professional care in preparing for participants; it also indicates that professionalism is expected of them.
- ▶ Make sure that the facilitator and all audio-visual materials can be seen and heard by all the participants (try sitting in a few different seats around the room).
- ▶ Organise the position of the tables and chairs to be most conducive to the learning activity (e.g. in rows, in circles for small groups, or positioned equi-distant around tables) but do ensure that everyone has adequate 'personal space'.
- ▶ Have enough supplies of extra pens and paper available.
- ▶ Have refreshments (tea, coffee, juice, water etc.) available in the morning before things get started.
- ▶ Plan for and implement comfort breaks that are frequent enough and long enough.

#### *Tip 3: Encourage active participation – some examples*

- ▶ Use participants' names as often as possible.
- ▶ Create pairs or small discussion groups to overcome any reluctance to share ideas or concerns in the wider group.
- ▶ Share something yourself to set an example of beginning an exchange of information or ideas.
- ▶ Use reinforcement – both verbal and non-verbal – to encourage participation; thank people for contributions, use positive nods, smiles, eye contact etc.

#### *Tip 4: Facilitate more than you lecture – some examples*

- ▶ Straight lectures are not usually required or essential; more often by facilitating experiential activities and participant discussions you will enhance the learning experience.
- ▶ Create discussion – not just between facilitator and the participants, but among the participants.
- ▶ Find out some opinions and ideas from participants before you deliver your information.
- ▶ Provide opportunities for participants to evaluate their own learning throughout the training programme – you could use a notebook or self-assessment sheets.
- ▶ Devise experiential learning activities (such as guided exercises or tasks) in which participants are allowed to discover new information and ideas for themselves.

# Appendix 2:

## Case studies

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### Case study 1: Hypoglycaemia

#### Case outline

- ▶ Mr P is 53 years old and has had type 2 diabetes for many years.
- ▶ Recently he started taking insulin twice a day because the tablets weren't controlling his blood glucose level.
- ▶ When he arrives at your clinic at 10:00 a.m., you notice that his speech is slurred and he is very slow to respond to your questions.

#### Questions for you

1. What could be happening to Mr P?
2. Why is it happening?
3. What can you do to help him?
4. When he has recovered, what questions would it be appropriate to ask him to help him prevent future episodes?

### Case study 2: Poor diabetes control

#### Case outline

- ▶ Mr S is 50 years old and has had type 2 diabetes for seven years.
- ▶ Initially he looked after his diabetes very well.
- ▶ Recently he:
  - has not been following his diet;
  - has had lots of stress at work;
  - has not done any physical activity;
  - has been gradually gaining weight; and
  - has been drinking four or five glasses of alcohol every day.
- When he comes to your clinic, his blood glucose level is always between 12.2 and 15.3 mmol/L.

#### Questions for you

1. What are the issues for Mr S?
2. Is this an emergency?
3. What should he be doing about his diabetes?
4. How could you help him?

## Appendix 3: Role plays

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**Note: The individual playing the role of educator should not see this outline prior to the role play.**

### *Scenario*

A man has recently been diagnosed with diabetes, and he needs lifestyle and diet education.

### *About the patient*

- ▶ Mr T is 37 years old and has just been diagnosed with type 2 diabetes.
- ▶ His height is 171 cm and weight is 106 kg.
- ▶ He has been feeling lethargic for 3 months. At the clinic he says he is thirsty and passes a lot of urine.
- ▶ A doctor or nurse has tested him and confirmed that he has diabetes.
- ▶ They decide that his treatment should begin with changes to his diet and lifestyle only.

### *Task for the community health worker*

- ▶ Mr T comes to you for education.
- ▶ How will you assess whether there are any barriers that may prevent Mr T from learning?
- ▶ How will you help him overcome those barriers?

Note:

Calculate his BMI so that you can assess his weight status.

# Appendix 4: Australian Type 2 Diabetes Risk Assessment Tool (AUSDRISK)

AUSDRISK may be downloaded at the following URL:

[http://www.health.gov.au/internet/main/publishing.nsf/Content/C73A9D4A2E9C684ACA2574730002A31B/\\$File/Risk\\_Assessment\\_Tool.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/C73A9D4A2E9C684ACA2574730002A31B/$File/Risk_Assessment_Tool.pdf)

Explanatory notes may be downloaded at the following URL:

[http://www.gpconnections.com.au/icms\\_docs/57789\\_Explanatory\\_notes\\_for\\_the\\_Australian\\_Type\\_2\\_281009.pdf](http://www.gpconnections.com.au/icms_docs/57789_Explanatory_notes_for_the_Australian_Type_2_281009.pdf)

## 1. Your age group

- Under 35 years  0 points
- 35 – 44 years  2 points
- 45 – 54 years  4 points
- 55 – 64 years  6 points
- 65 years or over  8 points

## 2. Your gender

- Female  0 points
- Male  3 points

## 3. Your ethnicity/country of birth:

### 3a. Are you of Aboriginal, Torres Strait Islander, Pacific Islander or Maori descent?

- No  0 points
- Yes  2 points

### 3b. Where were you born?

- Australia  0 points
- Asia (including the Indian sub-continent), Middle East, North Africa, Southern Europe  2 points
- Other  0 points

## 4. Have either of your parents, or any of your brothers or sisters been diagnosed with diabetes (type 1 or type 2)?

- No  0 points
- Yes  3 points

## 5. Have you ever been found to have high blood glucose (sugar) (for example, in a health examination, during an illness, during pregnancy)?

- No  0 points
- Yes  6 points

## 6. Are you currently taking medication for high blood pressure?

- No  0 points
- Yes  2 points

## 7. Do you currently smoke cigarettes or any other tobacco products on a daily basis?

- No  0 points
- Yes  2 points

## 8. How often do you eat vegetables or fruit?

- Everyday  0 points
- Not everyday  1 point

## 9. On average, would you say you do at least 2.5 hours of physical activity per week (for example, 30 minutes a day on 5 or more days a week)?

- Yes  0 points
- No  2 points

## 10. Your waist measurement taken below the ribs (usually at the level of the navel, and while standing)

Waist measurements (cm)

### For those of Asian or Aboriginal or Torres Strait Islander descent:

- | Men              | Women           |                                   |
|------------------|-----------------|-----------------------------------|
| Less than 90 cm  | Less than 80 cm | <input type="checkbox"/> 0 points |
| 90 – 100 cm      | 80 – 90 cm      | <input type="checkbox"/> 4 points |
| More than 100 cm | More than 90 cm | <input type="checkbox"/> 7 points |

### For all others:

- | Men              | Women            |                                   |
|------------------|------------------|-----------------------------------|
| Less than 102 cm | Less than 88 cm  | <input type="checkbox"/> 0 points |
| 102 – 110 cm     | 88 – 100 cm      | <input type="checkbox"/> 4 points |
| More than 110 cm | More than 100 cm | <input type="checkbox"/> 7 points |

Add up your points

## Your risk of developing type 2 diabetes within 5 years\*:

- 5 or less: Low risk**  
Approximately one person in every 100 will develop diabetes.
- 6-14: Intermediate risk**  
For scores of 6-8, approximately one person in every 50 will develop diabetes. For scores of 9-14, approximately one person in every 20 will develop diabetes.
- 15 or more: High risk**  
For scores of 15-19, approximately one person in every seven will develop diabetes. For scores of 20 and above, approximately one person in every three will develop diabetes.

\*The overall score may overestimate the risk of diabetes in those aged less than 25 years.

**If you scored 6-14 points in the AUSDRISK you may be at increased risk of type 2 diabetes.** Discuss your score and your individual risk with your doctor. Improving your lifestyle may help reduce your risk of developing type 2 diabetes.

**If you scored 15 points or more in the AUSDRISK you may have undiagnosed type 2 diabetes or be at high risk of developing the disease.** See your doctor about having a fasting blood glucose test. Act now to prevent type 2 diabetes.

## Appendix 5:

# Sources of additional information

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### Useful websites and URLs

▶ **The Secretariat of the Pacific Community (SPC)**

Visit the Healthy Pacific Lifestyle portal at the SPC website to access a wide range of resources such as posters, leaflets, information booklets and videos for use in the Pacific

[http://www.spc.int/ac/Healthy\\_Lifestyle/resources\\_posters.html](http://www.spc.int/ac/Healthy_Lifestyle/resources_posters.html)

▶ **Diabetes Australia and Royal Australian College of General Practitioners: Diabetes Management in General Practice.** Fifteenth edition 2009/10: Guidelines for Type 2 Diabetes

<https://www.racgp.org.au/Content/NavigationMenu/ClinicalResources/RACGPGuidelines/Diabetesmanagement/200910diabetesmanagementingeneralpractice.pdf>

▶ **The Australian Type 2 Diabetes Risk Assessment Tool (AUSDRISK)**

[http://www.health.gov.au/internet/main/publishing.nsf/Content/C73A9D4A2E9C684ACA2574730002A31B/\\$File/Risk\\_Assessment\\_Tool.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/C73A9D4A2E9C684ACA2574730002A31B/$File/Risk_Assessment_Tool.pdf)

▶ **Merck Online Manuals for Health Professionals: Diabetes Mellitus**

<http://www.merck.com/mmpe/sec12/ch158/ch158b.html>

▶ **The National Diabetes Education Program (USA)**

<http://www.ndep.nih.gov/>

▶ **American Diabetes Association.** 2010. Standards of medical care in diabetes

[http://care.diabetesjournals.org/content/33/Supplement\\_1/S11.full.pdf+html](http://care.diabetesjournals.org/content/33/Supplement_1/S11.full.pdf+html)

▶ **American Heart Association.** 2009. Exercise training for type 2 diabetes mellitus: impact on cardiovascular risk: a scientific statement from the American Heart Association

<http://circ.ahajournals.org/cgi/reprint/CIRCULATIONAHA.109.192521>

▶ **The Task Force on Diabetes and Cardiovascular Diseases of the European Society of Cardiology (ESC) and of the European Association for the Study of Diabetes (EASD).** 2007. Guidelines on diabetes, pre-diabetes, and cardiovascular diseases.

<http://www.escardio.org/guidelines-surveys/esc-guidelines/GuidelinesDocuments/guidelines-diabetes-FT.pdf>

▶ **The WHO Stepwise Planning Framework for chronic diseases and health promotion**

[http://www.who.int/chp/chronic\\_disease\\_report/part4\\_ch1/en/index2.html](http://www.who.int/chp/chronic_disease_report/part4_ch1/en/index2.html)

▶ **2008 Physical Activity Guidelines for adults (USA)**

<http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html>

▶ **The Official Website of the Glycaemic Index and GI Database**

<http://www.glycemicindex.com/>

## Appendix 6:

# Guidelines on hypoglycaemia

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- ▶ Every patient commenced on Daonil/Glibenclamide or insulin therapy needs education on how to detect and treat hypoglycaemia.
- ▶ Hypoglycaemia is having a low blood glucose level of 4 mmol/l or less, or the presence of symptoms of hypoglycaemia.
- ▶ Symptoms of hypoglycaemia are:
  - cold sweat
  - tremor
  - tingling in the lips or mouth
  - palpitations
  - pounding headache
  - feeling faint or hungry
  - light headedness
  - irritability
  - confusion
  - decreased or loss of consciousness
  - blurred vision
  - lack of concentration
  - aggressive behaviour
- ▶ If the patient experiences symptoms of hypoglycaemia or a blood glucose level of 4 mmol/l or less, administer quick-acting sugar immediately. If the patient is unconscious, do not administer anything orally and seek medical attention immediately.
- ▶ Examples of quick-acting sugar are:
  - 2 teaspoons of sugar
  - 2 teaspoons of honey or jam
  - 1 glass of fruit juice
  - ½ can of soft drink
  - 6 jelly beans or soft lollies
  - 1 ripe banana
- ▶ Recheck blood glucose level in 15 minutes if available.
- ▶ If blood glucose level is < 4 mmol/l or patient is not feeling better, repeat administration of quick-acting sugar.
- ▶ Administer long-acting carbohydrate or have a meal if it is due.
- ▶ Examples of long-acting carbohydrates are:
  - 1 piece of fruit
  - 1 sandwich
  - 2 biscuits
- ▶ Identify the cause of hypoglycaemia:
  - missing a meal, delayed meal or no carbohydrate in previous meal
  - physical activity or exercise
  - too much Daonil or insulin
  - too much alcohol, or alcohol on an empty stomach
- ▶ A patient experiencing hypoglycaemia should rest.
- ▶ A patient at risk of hypoglycaemia should carry quick-acting sugar with them at all times.

## Appendix 7:

# Guidelines for patient referral

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These guidelines apply for referring patients to a diabetes clinic from a local health centre clinic (or equivalent).

The following patients with diabetes **should be referred to the diabetes clinic**:

1. all newly diagnosed diabetics;
2. all patients on insulin treatment;
3. patients known to have diabetes with:
  - unsatisfactory or poorly controlled blood glucose control after two to three consecutive reviews (see blood glucose control categories below); or
  - recurrent or severe hypos;
4. blood pressure is consistently > 130/80 after 2-3 consecutive reviews; and
5. all pregnant patients with diabetes or gestational diabetes.

**The following conditions will require urgent referral:**

- ▶ blood glucose > 25 mmol/L with symptoms;
- ▶ blood pressure > 200/110;
- ▶ severe hypo;
- ▶ pregnant patients with diabetes; and
- ▶ foot infection.

### Blood glucose control categories based on blood glucose visual strips (Betachek)

	Pre-meal blood glucose	Post meal blood glucose
Normal – good control	4–6.0 mmol/L	4–7.7 mmol/L
Fair control – minimises microvascular complications	6.1–6.9 mmol/L	7.8–11.0 mmol/L
Referral for more active treatment	> 7.0 mmol/L	> 11.1 mmol/L

*Note: The International Diabetes Federation suggests a postprandial target of < 7.8 mmol/L (2 hours after meal).*

### Treatment of blood glucose for patients with type 2 diabetes

Check list

- ▶ Has the patient had education about diet, physical activity, medication and hypos?
- ▶ Have you checked the patient's feet? (See notes on foot assessment in Topic 4.2, Learning module 4.)
- ▶ Has the patient had any hypos? (See guideline on hypoglycaemia in Topic 6.2, Learning module 6.)
- ▶ Is the patient taking their medication?
- ▶ Does the patient have high blood pressure? (See notes on hypertension in Topic 4.2, Learning module 4.)

Newly diagnosed

- ▶ Start treatment with diet + exercise if the patient feels well and blood glucose is < 20.0 mmol/L.
- ▶ Refer to hospital clinic for assessment and work up of newly diagnosed diabetes.
- ▶ Make an urgent referral if blood glucose is > 20.0 mmol/L and the patient has symptoms.

### Starting oral agents and adjusting dose

- ▶ If blood glucose level is unsatisfactory or poor on diet + exercise, then start one oral agent for diabetes. Start:
  - Daonil (Glibenclamide) 5 mg morning; or
  - Metformin 500 mg twice a day. (Do not use Metformin if renal failure – check serum creatinine.)Review after 2–4 weeks and increase dose if unsatisfactory or poor control.
- ▶ But first check:
  - Does the patient understand what their diet needs are?
  - Is the patient taking their medication?
  - Is the patient experiencing any hypos?
  - Is the patient experiencing any side effects from medication (nausea, diarrhoea with Metformin)?
- ▶ If you increase the dose:
  - for Daonil, 5 mg in morning becomes 5 mg twice a day or 10 mg in morning; 5 mg in the afternoon becomes 10 mg twice a day; and
  - for Metformin: 500 mg twice a day becomes 500 mg twice a day → 1000 mg twice a day
- ▶ If blood glucose control is unsatisfactory or poor on one agent, then add a second agent.
- ▶ Insulin treatment will need to be commenced if blood glucose control is poor on a combination of maximum doses of Daonil+Metformin.

## Glossary of terms

Amputation	Removal of part of a leg or arm in surgery. This procedure is used to prevent an infection from spreading further when it cannot be treated, or to remove dead tissue
Blood glucose control	See <b>glycaemic control</b>
Blood pressure	Level of pressure in the blood vessels. See also <b>hypertension</b>
Body-building foods	Foods that are rich in protein and other nutrients e.g. meat, fish, shellfish, milk, eggs, beans, nuts and seeds. This type of food forms one of the three main food groups
Carbohydrate	Type of macronutrient that includes sugars and starches
Cataract	A clouding of the lens in the eye. As it worsens, it limits sight
Cholesterol	Type of fat (lipid) found in the blood. It exists mainly as HDL and LDL types. See <b>HDL</b> and <b>LDL</b>
Diabetes control	The process of maintaining good blood sugar control, along with control of other risk factors such as blood pressure and fat levels
Exercise	A type of planned physical activity that is relatively strenuous
Fibre	A substance that helps to keep the gut active and prevent constipation. The soluble fibres found in fruits, vegetables, oats, beans and lentils are particularly effective at lowering blood cholesterol
Gestational diabetes	A type of diabetes that occurs in pregnancy due to the extra strain on the body during this time. It usually goes away after delivery but it increases the risk of developing type 2 diabetes later
Glucose	A type of sugar found in the blood. It provides the main fuel for muscles and the brain
Glycaemic control (blood glucose control)	The ability to keep blood glucose levels within normal limits
Glycaemic index (GI)	A system of rating carbohydrate-containing foods. This scale ranks carbohydrate-containing foods based on their effect on blood sugar levels over a period of time – usually 2 hours. The GI compares foods that have gram-for-gram the same amount of carbohydrate
Glycosuria	The presence of sugar in the urine
Glycosylated haemoglobin (HbA1c)	A measure of how much haemoglobin in the blood has glucose attached to it. It measures glycaemic control over the last 3 months
HDL	High blood HDL levels decrease the risk of heart attack. Levels can be increased by being physically active and limiting alcohol and sugar intake
Heart attack (coronary heart disease)	When the heart stops beating
Hyperglycaemia	High blood glucose levels. It is linked with an increased risk of diabetes complications
Hypertension (high blood pressure)	When blood pressure is higher than recommended. Hypertension is a risk factor for stroke and heart attack
Hypoglycaemia	Low blood glucose levels (below cut-off points). In some people it may cause symptoms such as dizziness, fainting and sweating. It only occurs in diabetics treated with insulin or certain tablets

Impaired glucose tolerance (IGT)	When the blood glucose levels are higher than normal, but not high enough to diagnose diabetes in an individual. About 80 per cent of people diagnosed with IGT later develop diabetes. However, by following a healthy lifestyle and losing any excess weight, people with IGT can reduce this risk
Insulin	Hormone produced by the body that lowers blood glucose levels. It is defective or insufficient in type 2 diabetics
Ischaemic heart disease	Heart attack. See <b>heart attack</b>
Ketosis	Elevated levels of the chemical 'ketones' in the blood, occurring when the liver converts fat into fatty acids (for example when the body is low on carbohydrate and is using fat for energy); someone who has ketosis is 'ketotic'
LDL	High LDL levels in the blood increase the risk of heart attack. Levels of LDL are increased by diets that are high in fat and low in fibre
Macrovascular complications	Diabetic complications that affect the blood vessels
Microvascular complications	Diabetic complications that affect the nerves
Neuropathy	Loss of nerve function, resulting in a loss of feeling in affected areas
Oral hypoglycaemic agents (OHAs)	Tablets that are used to lower blood glucose levels
Physical activity	Any action in which the body moves and expends energy e.g. walking, housework, gardening
Protective foods	All fruits and vegetables (except for root crops, which are starchy energy foods). This type of food forms one of the three food groups
Retinopathy	Eye disease that can cause blindness. It can develop as a result of a poor diabetes control
Risk factors	Things that make it more likely (but not certain) that a particular problem will develop
Starchy energy foods	Foods rich in starchy carbohydrate such as root crops, breadfruit, bread, pasta, noodles and rice. This type of food forms one of the three food groups
Stroke	When the blood supply to the brain is cut off, sometimes resulting in paralysis or even death. The risk of stroke is increased with high blood pressure (see <b>hypertension</b> )
Systematic review	A systematic literature review is a means of identifying, evaluating and interpreting all available research relevant to a particular question or topic area. A systematic review has the following features: (a) a defined review protocol that sets out the research question being addressed and the methods to be used; (b) a defined search strategy that aims to detect as much of the relevant literature as possible; (c) explicit documentation of the search strategy so that readers can assess its rigour and completeness; (d) explicit inclusion and exclusion criteria to assess each potential primary study; and (e) specification of the information to be obtained from each primary study including the quality criteria by which the primary studies are to be evaluated
Triglycerides	Type of fat found in the blood that increases the risk of a heart attack. Levels are increased when a person consumes high levels of sugar and alcohol, and has low levels of physical activity

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