



DIABETES MANAGEMENT GUIDELINES

Fourth Edition



MINISTRY OF HEALTH & MEDICAL SERVICES
GOVERNMENT OF FIJI
2024

DIABETES MANAGEMENT GUIDELINES

Fourth Edition

MINISTRY OF HEALTH AND MEDICAL SERVICES

Government of Fiji

2025

Disclaimer

The authors do not warrant the accuracy of the information contained in these guidelines and do not take responsibility for any deaths, loss, damage or injury caused by using the information contained herein.

While every effort has been made to ensure that the information contained in these guidelines is correct and in accordance with current evidence-based clinical practice, the dynamic nature of medicine requires that users exercise in all cases independent professional judgement when using these guidelines.

Original text: English

Pacific Community Cataloguing-in-publication data

Diabetes management guidelines : fourth edition

1. Diabetes – Fiji.
2. Diabetes – Prevention — Fiji.
3. Community health services — Fiji.

I. Title II. Fiji. Ministry of Health and Medical Services III. Pacific Community

362.196462099611

AACR2

ISBN: 978-982-00-1604-0

Prepared for publication at SPC's Suva Regional Office, Private Mail Bag,
Suva, Fiji, 2025

www.spc.int | spc@spc.int

Acknowledgements

The fourth edition of the *Diabetes Management Guidelines* was revised and updated by a sub-committee of the National Medicines and Therapeutics Committee.

The National Wellness Centre under the Head of Wellness provided coordination for the review and requested assistance from the Pacific Community to support the development of the Guidelines. The National Wellness Centre, and the Diabetes Clinical Services Network (CSN) updated this edition alongside contributions and comments from the following:

Dr Shrish Acharya

Consultant Physician;
Head of Department, Medicine;
Chairperson, Medical and Diabetes
Clinical Services Networks

Dr Devina Nand

Head of Wellness, Chair NCD and
PHC Thematic Working Group –
Donor Coordination

Dr Akesh A Narayan

SDMO Suva Sub-Division

Dr Avnit Kumar

SDMO Ra Sub-Division

Dr Momtaz Ahmed

Head of Diabetes Hub Centre, Suva;
Diabetes Management Guidelines
Coordinator

Sera Ratulailai

Nurse-in-charge, Diabetes Centre,
Suva

Dr Unaisi Vailawa

Medical Officer, Diabetes Hub,
Lautoka

NP Lalesh Kumar

Diabetes Centre, Labasa

Dr Lisi Finiasi

Senior Medical Officer Diabetes
Centre, Suva

Rohin Latchmi

NCD Project Officer,
Western Division

Dr Alvis Zibran

Chair Fiji PEN (Package of Essential
Non-Communicable Disease) Core
Working Group (CWG)

Dr Anis Taeed

Consultant Nephrologist

Dr Semesa Matanaicake

HOD Surgery; Chairperson of
Surgical CSN

Dr Ilisapeci Tuibeqa

Consultant Paediatrician; Head of
Department Paediatrics, Chairperson
Paediatric CSN

Dr Antoinette Davis

Representative from Paediatric CSN

Dr Kelera Sakumeni

Consultant Obstetrician; Chairperson
Obstetrics CSN

Dr Nitik Ram

Representative from O&G CSN

Dr Luisa Cikamatana

Consultant Ophthalmologist;
Chairperson Ophthalmology CSN

Dr Ieli Fakraufon

HOD Anaesthesia CWM

Dr John Susau

Representative from Oral Health CSN

Moreen Devi

Chairperson, Pharmacy CSN

Dr Redwan Al Karim

Former Head of Department, Skin Clinic, Tamavua

Ateca Kama

Chief Dietitian and Nutritionist;
Chairperson of the Dietetics and Nutrition CSN

Alvina Deo

Manager National Food and Nutrition Centre

Natasha Sheron

Nutrition Lecturer, College of Medicine, Nursing and Health Science, Fiji National University

Dr Balram Pandit

Medical Superintendent, St Giles Hospital, Suva

Dr Basharat Munshi

President of Fiji Medical Association

Ravendra Prasad

Superintendent CWM Lab,
Chairperson - Laboratory CSN

Marawa Kini

CEO, Diabetes Fiji Inc

Silpa Kumar

Colonial War Memorial Hospital Pharmacy

Josifini Tuiloma

Physiotherapy Superintendent;
Chairperson Physiotherapy CSN

Dr Ilisapeci Kubuabola-Samisoni

Pacific Community (SPC)

Dr Rajesh Maharaj

President, Fiji College of General Practitioners

Dr Hardit Pandit

Fiji College of General Practitioners

Viliame Qio

College of Medicine, Nursing and Health Sciences, Fiji National University

In addition, we thank all medical staff of Diabetes Hub centres and members of the NCD/Wellness Unit, MOH, as well as all members of the following:

- Diabetes and Medical CSNs
- NCD/Wellness Unit, MOH
- Obstetrics and Gynaecology CSN
- Anaesthesia CSN
- Nephrology CSN
- Ophthalmology CSN
- Dietetics and Nutrition CSN
- Paediatric CSN
- Surgical CSN
- Mental Health CSN
- Pharmacy CSN
- Laboratory CSN
- Physiotherapy CSN
- Diabetes Fiji Inc.
- All other participants who were present in the meetings.

Special thanks to Dr Gyaneshwar Rao, Consultant Physician at CWMH and the above people for their continuous support during this process.

We also acknowledge the Divisional Medical Officers Western (Dr Abdul Shah), Northern (Dr Tiko Saumalua), Eastern (Dr Sravaniya Dasi), Central (Dr Tevita Qoriniasi) and the Medical Superintendent of CWMH, Dr Luke Nasedra for their continuous support.

Contributions and comments were welcomed and gratefully received from Divisional and Sub-Divisional Officers. Secretariat support was provided by National Project Officer, Non-Communicable Diseases, and Ministry of Health and Diabetes Fiji Incorporated.

A special acknowledgement to the Public Health Division (PHD) team of the Pacific Community (SPC):

- Dr Si Thu Win Tin, Team Leader, Non-Communicable Diseases Prevention and Control Programme
- Dr Ilisapeci Kubuabola-Samisoni, Non-Communicable Diseases Adviser – Monitoring, Evaluation and Surveillance
- Dr Tanieru Tekiang, Non-Communicable Diseases Adviser – Advocacy and Civil Societies Engagement.

Preface

Diabetes remains one of the most pressing public health challenges in Fiji, with a profound and growing impact on the health and wellbeing of our population. The burden of diabetes is immense, as it not only affects individuals but also places a heavy strain on families, communities, and the health system. In recent years, the prevalence of diabetes in Fiji has reached alarming levels, contributing significantly to morbidity, mortality, and disability. This has made diabetes a leading cause of death and severe complications in the country, cutting lives short and diminishing the quality of life for many.

Currently, diabetes-related complications, including heart disease, kidney failure, blindness, and lower-limb amputations, continue to rise, placing enormous pressure on the healthcare system. Amputations alone are a common and tragic consequence of uncontrolled diabetes, and Fiji has one of the highest amputation rates per capita in the world. Furthermore, diabetes is a major cause of premature death, with many individuals losing their lives at an early age due to inadequate management and delayed diagnosis. These complications are not only preventable but also contribute to prolonged disability, reducing the productivity and economic participation of many Fijians. The toll of diabetes extends beyond the individual, affecting families' livelihoods and placing additional burdens on caregivers.

The 2024 *Diabetes Management Guidelines* for Fiji have been developed to address this growing crisis and provide a comprehensive, standardised approach to diabetes care across the country. The primary goal of these guidelines is to improve the quality of life for people living with diabetes by preventing complications and reducing the overall burden of the disease. To achieve this, the guidelines are designed to ensure that healthcare providers at all levels — whether working in rural or urban settings — have access to evidence-based, practical guidance on how to manage diabetes effectively. These guidelines aim to provide a clear and consistent framework for delivering high-quality care, from early diagnosis and education to advanced treatment and management of complications.

The objective of these guidelines is twofold: first, to standardise diabetes care across Fiji by establishing clear protocols for diagnosis, treatment, and follow-up care. This will ensure that all Fijians, regardless of where they live, receive the same level of care and support in managing their condition. Second, the guidelines seek to empower healthcare professionals with the necessary tools and knowledge to provide patient-centred care, focusing not just on controlling blood sugar levels but also on enhancing the overall wellbeing and quality of life of individuals with diabetes. By adhering to these standardised protocols, we aim to reduce the incidence of complications, improve health outcomes, and ultimately extend the life expectancy of those affected by diabetes.

Continued next page

In conclusion, the 2024 *Diabetes Management Guidelines* is a vital resource for all health practitioners in Fiji. They serve as a practical tool to guide the

effective management of diabetes, ensuring that every patient receives the highest standard of care. With the successful implementation of these guidelines, we can make significant strides toward reversing the tide of diabetes and its devastating consequences on individuals, families, and the nation.

Dr JEMESA TUDRAVU

Permanent Secretary

Ministry of Health and Medical Services

Table of contents

Disclaimer	iii
Acknowledgements.....	iv
Preface	vii
Table of contents	ix
List of figures and tables	xi
1.0 The National Wellness and Primary Health Care Programme in Fiji	1
1.1 Diabetes and public health.....	1
1.2 Diabetes registration and notification	4
1.3 Diabetes epidemiology	4
1.4 Public health concern.....	5
1.5 Pathophysiology.....	6
1.6 Incidence and prevalence.....	6
1.7 Diabetes mortality in Fiji	8
1.8 Conclusion	10
2.0 Introduction	11
2.1 Recognition	11
2.2 Diagnosis of diabetes mellitus	12
3.0 The management of diabetes in adults	14
3.1 Clinical assessment	14
3.2 Categories and referral recommendations.....	15
3.3 Non-pharmacological intervention (lifestyle management)	16
3.4 Management of hyperglycaemia.....	38
3.5 General approach to the management of diabetes	52
3.6 Special situations in the management of diabetes.....	55
4.0 Diabetes and cardiovascular risk management	58
4.1 What is the Fiji Cardiovascular Risk and Management Guidelines (CRAM)?.....	58
4.2 Hypertension.....	62
4.3 Hyperlipidaemia and dyslipidaemia.....	63
4.4 Antiplatelet therapy.....	65
5.0 Management of acute complications of diabetes	67
5.1 Hypoglycaemia	67
5.2 Diabetic ketoacidosis (DKA)	69
5.3 Hyperosmolar, hyperglycaemic state	74
6.0 Management of late complications of diabetes.....	75
6.1 Retinopathy	75
6.2 Diabetic kidney disease	78
6.3 Neuropathy	83
6.4 Diabetic foot disease	85
7.0 Preoperative management	98
7.1 Preoperative assessment.....	98
7.2 Intraoperative management.....	98
7.3 Postoperative management	98
7.4 Additional considerations	99
8.0 Targets for control in diabetes	100
9.0 Diabetes in children	101
9.1 Introduction.....	101
9.2 Aim	101

9.3	Parameters	101
9.4	Definitions.....	101
9.5	Screening.....	102
9.6	Referral.....	102
9.7	Clinical presentation.....	103
9.8	Management.....	104
9.9	Age-based care	107
9.10	Diabetic Ketoacidosis (DKA) is an endocrine emergency.....	108
9.11	Type 2 diabetes	109
9.12	Other causes of diabetes.....	112
9.13	Transition from paediatric to adult care.....	112
9.14	Infant of a diabetic mother (IDM).....	112
10.0	Diabetes in pregnancy	115
11.0	Diabetes and COVID-19.....	132
12.0	Diabetics and disasters.....	133
13.0	Common skin problem in diabetes	136
14.0	Diabetes and oral health.....	139
15.0	The role of care givers	144
16.0	Available services and support for diabetes care	146
17.0	References.....	147
18.0	Annexes	152
	Annex 1: GI table	152
	Annex 2: Importance of 24-hour physical behaviours for type 2 diabetes.....	153
	Annex 3: Insulin dosage	154
	Annex 4: Key intervention points and associated action required	156
	Annex 5: Questionnaire.....	157
	Annex 6: PHQ-9 Patient Health Questionnaire.....	158
	Annex 7: Diabetes Notification Form.....	158

List of figures and tables

Figures

Figure 1. Diabetes mortality by years as a percentage of all-causes mortality	8
Figure 2. Diabetes mortality by gender from 2002–2021.....	8
Figure 3. Diabetes mortality by division.....	9
Figure 4. Percentage of diabetes mortality by ethnicity	9
Figure 5. Criteria for referral to higher levels of care.....	15
Figure 6. How carbohydrates work in the body.....	18
Figure 7. The three major food groups, healthy options and meal proportions	19
Figure 8. Measures of standard alcoholic drinks	24
Figure 9. Interplay between diabetes, major depressive disorder and other psychiatric conditions.....	32
Figure 10. Insulin injection sites.....	48
Figure 11. Insulin pens are now available in many styles. Source: www.insulinpens.com	50
Figure 12. Treatment flow chart.....	54
Figure 13. WHO Oceania CVD Risk chart.....	59
Figure 14. WHO cardiovascular risk score colour coding.....	59
Figure 15. An algorithm for when to prescribe anti-hypertensive medications	62
Figure 16. Algorithm for determining if a patient needs statins	64
Figure 17. Algorithm for determining if a patient needs Aspirin?.....	65
Figure 18. A pragmatic approach to CKD screening in Fiji. ACR, albumin-to-creatinine ratio; eGFR, estimated glomerular filtration rate as calculated from serum creatinine using CKD-EPI or MDRD equations	79
Figure 19. Classification and predicting prognosis of CKD.....	80
Figure 20 Summary of key management steps	81
Figure 21. Factors guiding decisions on individual HbA1c targets – adapted from KDIGO 2022 Clinical practice guideline for management of diabetes management in CKD.....	82
Figure 22. Mechanism of ulcer developing from repetitive or excessive mechanical stress. Image: IWGDF Guidelines 2023.....	86
Figure 23. Foot assessment and scoring	88
Figure 24. Pressure perception using Semmes-Weinstein 10 gram monofilament test	89
Figure 25. Vibration perception using a 128Hz tuning fork.....	89
Figure 26. How to classify diabetic foot infection	90
Figure 27. Algorithm for DFU and DFS/DFI surgical referral	94
Figure 28. Algorithm for initial dosing of insulin for a child with newly diagnosed T1DM using multiple daily injections	105
Figure 29. Management algorithm of new-onset diabetes in youth with overweight or obesity with clinical suspicion of type 2 diabetes.....	111
Figure 30. Initial approach to glucose management in patients with newly diagnosed gestational diabetes mellitus at 24 to 28 weeks of gestation.	120
Figure 31. Care of uncomplicated gestational diabetes	122

Tables

Table 1: Productivity losses due to death, absenteeism and presenteeism .	5
Table 2. Diagnostic criteria for diabetes mellitus	13
Table 3. Clinical assessment of diabetic patients on initial visit	14
Table 4. Healthy fats	20
Table 5. Unhealthy fats	20
Table 6. Glycaemic index for food items	22
Table 7. Precautions for patients with long-term complications	25
Table 8. Exercises for type 1 diabetes	25
Table 9. An exercise guide using the FITT principle [Ref: Fiji CRAM Guideline, 2023].....	29
Table 10. Referral pathways by divisions	30
Table 11. DPP4 inhibitors	42
Table 12. SGLT2 inhibitors.....	44
Table 13. Types of insulin, administration and availability	47
Table 14. Targets to ensure good diabetic control	53
Table 15. Deciding who to a higher-level health facility.....	61
Table 16. Indications for starting treatment	63
Table 17. Lipid targets	63
Table 18. Summary of risk management	66
Table 19. Signs and symptoms of hypoglycaemia.....	67
Table 20. Diagnostic features of diabetic ketoacidosis.....	69
Table 21. Insulin dosage calculation for weight	71
Table 22. Potassium levels and supplements	72
Table 23. Monitoring parameters, frequencies and targets	73
Table 24. Major risk factors for the development of complications.....	75
Table 25. Diabetic retinopathy guidelines.....	76
Table 26. SINBAD classification system	87
Table 27. Classification to be used when there is peripheral vascular disease (PAD).....	91
Table 28. Diagnosing necrotising fasciitis	92
Table 29. The IWGDF 2023 Risk Stratification System.....	93
Table 30. Surveillance using the IWGDF 2023 Risk Stratification System .	93
Table 31. Wound grading.....	96
Table 32. Foot infection grading	97
Table 33. Targets for control in diabetes	100
Table 34. Diagnostic criteria for diabetes	102
Table 35. Risk-based screening for T2DM or pre-diabetes in asymptomatic children and adolescents.....	102
Table 36. Characteristics of Type 1 and Type 2 DM in children and adolescents	103
Table 37. A1c targets and indications	106

Table 38. Management plan for childhood-onset T1DM107

Table 39. Urine ketone and serum ketone levels.....109

Table 40. Recommended glycaemic targets Type 2 DM.....110

Table 41 Risk markers for diabetes in pregnancy117

1.0 The National Wellness and Primary Health Care Programme in Fiji

1.1 Diabetes and public health

Diabetes is increasingly recognised as a significant public health challenge globally, due to its rising prevalence and the serious complications associated with the condition. Effective public health interventions are essential to mitigate the impact of diabetes, focusing on prevention, education, accessible healthcare, and lifestyle changes.

Key interventions include:

1. **Strengthening governance:** Enhancing frameworks that support improvements in Diabetes Prevention and Control.
2. **Health literacy:** Increasing public knowledge about diabetes symptoms, causes, and complications to promote early detection and prevention.
3. **Screening programmes:** Expanding programmes to identify at-risk individuals and undiagnosed cases of diabetes.
4. **Promoting healthy lifestyles:** Encouraging practices such as healthy eating, regular physical activity, and effective weight management.
5. **Access to healthcare services:** Ensuring that individuals have access to affordable and comprehensive diabetes care, including medications, monitoring tools, and specialist services. This involves improving the capacity at primary healthcare levels and expanding specialist care through decentralised approaches.
6. **Technology and innovation:** Utilising telehealth and real-time surveillance systems to enhance care access and management.
7. **Policy initiatives:** Implementing policies that foster healthier environments in schools, workplaces, and communities to support diet and exercise.
8. **Community support programmes:** Developing support groups and community initiatives to aid in diabetes management and address psychosocial challenges. This includes strengthening networks for early referrals and community connection.
9. **Resource and funding improvements:** Securing adequate funding and resources for both interventions and ongoing clinical care.
10. **Surveillance and research:** Conducting research and routine surveillance to monitor diabetes trends and understand epidemiology, which informs further policy and intervention strategies.

The overarching aim of these guidelines is to equip healthcare professionals in Fiji with evidence-based practices for the prevention, diagnosis, management, and ongoing care of diabetes.

Objectives include:

- **Promoting optimal patient care:** Outlining best care practices to enhance health outcomes and quality of life.
- **Standardising care:** Ensuring consistent healthcare practices across all service levels.
- **Evidence-based practices:** Integrating current research and data into clinical decision-making.
- **Multidisciplinary approach:** Encouraging cooperation among various healthcare professionals to provide comprehensive diabetes care.
- **Patient empowerment:** Improving health literacy to help patients manage their condition actively.
- **Preventing complications:** Offering strategies to delay or prevent the onset of diabetes-related complications.
- **Monitoring and follow-up:** Establishing regular monitoring and follow-up practices to adapt management plans as needed.
- **Optimising resources:** Efficient allocation of healthcare resources and cost-effective care.
- **Adaptability and resilience:** Updating guidelines based on new research and being adaptable to changes such as natural disasters or pandemics.

These structured guidelines aim to enhance the quality of diabetes care, improve healthcare provider expertise, and achieve better health outcomes for those affected by diabetes in Fiji.

1.1.2 The National Wellness Strategic Plan and diabetes prevention and control

The reviewed National Wellness Strategic Plan has a vision of ensuring that “every Fijian will be well in body, mind and spirit”. The plan is divided into three strategic priorities: Priority Area (PA) 1 – Wellness Promotion and Disease Prevention Keeping the Well; PA 2 – Clinical Treatment and Management Optimising Care for People with NCDs; PA 3 – Foundational Systems and Enabling Supports Creating Efficient and Effective Operations with the mission to create an inclusive, dynamic and resilient landscape that empowers Fijians to achieve optimal wellbeing.

To be able to achieve the vision and work towards the mission, the national health system with its development partners needs to: invest in strengthening public health systems, preventive fiscal, economic, infrastructural, social, multisectoral strategies to enhance preventive approaches; invest in health promotion at all levels to improve the understanding of diabetes, its risk factors and prevention and control for the general population; improve and decentralise specialist care to primary health care (PHC) levels (periodic, outreach or static clinics); improve capacity of health professionals through optimal, regular, standardised training with recognised accreditation frameworks; develop, review and sustain best practice through a combination of good evidence driving a whole systems approach; implement high

standards of care through a range of quality improvement activities; invest in quality information systems that provide relevant and timely data to support decision-making at all levels; encourage relevant research and development; promote the health and welfare of people with diabetes and provide relevant support for caregivers/social support networks; provide a comprehensive integrated health services including specialist services, ambulatory care and palliation; while ensuring that an effective monitoring and evaluation framework is in place.

The National Wellness Strategic Plan (NWSP) under priority area 2 (PA 2) refers to the following strategies that strengthen prevention and control of diabetes:

- Strengthen the diagnosis and treatment of key non-communicable diseases
- Improve the management of patients with non-communicable disease to enhance patient care, satisfaction, and health outcomes
- Provide supportive care to individuals with transitional healthcare needs
- Strengthen data and health information systems to ensure the collection, analysis, dissemination, and use of relevant information to improve patient health
- Strengthen the provision of essential equipment, technologies, supplies, and medication in primary healthcare facilities
- Strengthen engagement and cooperation with public and private healthcare entities to improve continuity of patient care and effectiveness
- Strengthen the capacity of the Ministry of Health and Medical Services to provide NCD services to vulnerable populations during emergencies.
- Implementation of the NWSP will enhance health care delivery in the integrated Wellness and NCD arena and will impact the effectiveness of prevention and control strategies for diabetes.

1.1.3 Primary health care in Fiji

The concept of primary health care (PHC) has been repeatedly reinterpreted and redefined in the years since 1978 and the simple definition to facilitate the coordination of future PHC efforts at the global, national, and local levels and to guide their implementation:

“PHC is a whole-of-society approach to health that aims at ensuring the highest possible level of health and wellbeing and their equitable distribution by focusing on people’s needs and as early as possible along the continuum from health promotion and disease prevention to treatment, rehabilitation and palliative care, and as close as feasible to people’s everyday environment.” (*A vision for primary health care in the 21st century: towards universal health coverage and the Sustainable Development Goals*, WHO and UNICEF, 2018.)

The three synergistic components of PHC include a comprehensive integrated health services that embrace primary care as well as public health goods and functions as central pieces; multisectoral policies and actions to address the upstream and wider determinants of health; and engaging and empowering individuals, families, and communities for increased social participation and enhanced self-care and self-reliance in health. *Primary health care medical services* are extended by physicians, physician assistants, nurses, or other health professionals who have the first contact with a patient seeking medical treatment or care. About 90% of medical visits can be treated by the primary care provider. These include treatment of acute and chronic illnesses, preventive care, and health education for all ages and both sexes. *Secondary care medical services* are provided by medical specialists in their offices or clinics or local community hospital for a patient referred by a primary care provider who first diagnosed or treated the patient. Some primary care providers may also take care of hospitalised patients and deliver babies in a secondary care setting. *Tertiary care medical services* are provided by specialised hospitals or regional health centre well equipped with diagnostic and treatment facilities.

1.2 Diabetes registration and notification

All newly diagnosed cases of diabetes must be registered and notified via the **Diabetes Notification Form** (refer to *Annex 7*). Notification of all new cases is compulsory. Forms are to be sent to the Data Analysis and Management Unit (DAMU) of the MHMS. The notification should be done at all levels and all health facilities for routine surveillance.

1.3 Diabetes epidemiology

Diabetes mellitus is a complex metabolic disorder characterised by hyperglycaemia, with several subtypes each stemming from different causes. Type 1 diabetes involves autoimmune destruction of pancreatic beta cells, leading to insulin deficiency. In contrast, type 2 and other forms often involve insulin resistance and/or varying degrees of insulin deficiency. Type 1 constitutes about 5% of cases, type 2 accounts for 90%, and other types make up the remaining 5%. Over the past three decades, diabetes incidence and prevalence have increased globally, driven by factors such as the obesity epidemic and ageing populations. The disease disrupts glucose metabolism, leading to severe metabolic complications like diabetic ketoacidosis and hyperosmolar syndrome, while treatment can induce hypoglycaemia. Long-term complications affect multiple organs, including nerves, eyes, kidneys, and the cardiovascular system, substantially increasing mortality risks, particularly from cardiovascular diseases.

1.4 Public health concern

Type 2 diabetes is a major public health issue in Fiji, significantly impacting life quality and economic productivity. In 2019, the total productivity losses due to diabetes were estimated between FJD \$105 m and FJD \$145 m, encompassing death, absenteeism, and presenteeism costs. The cost of diabetes care is at least 3.2 times greater than the average per capita healthcare expenditure, rising to 9.4 times in presence of complications. This economic strain reflects a broader trend where rapid urbanisation and lifestyle changes lead to higher rates of diabetes. The disease mostly affects individuals over 60 but has also been causing premature mortality in younger populations. Unhealthy diets, sedentary lifestyles, and higher BMIs are primary contributors. The financial burden of diabetes care is notably higher than average healthcare costs, especially when complications arise, highlighting the need for improved awareness and control measures.

Table 1: Productivity losses due to death, absenteeism and presenteeism

NCD category	Productivity losses due to			
	Deaths	Absenteeism	Presenteeism	Total
High estimate (using human capital approach for productivity losses due to deaths)				
Diabetes	\$40,017,742	\$7,301,887	\$97,754,016	\$145,073,645
Cardiovascular disease	\$96,466,497	\$7,076,414	\$15,527,810	\$119,070,721
Chronic respiratory disease	\$12,700,275	\$7,673,085	\$16,401,218	\$36,774,578
Neoplasms	\$32,574,817	\$2,866,041	\$3,353,225	\$38,794,084
Total for selected NCDs	\$181,759,332	\$24,917,427	\$133,036,270	\$339,713,028
Low estimate (using friction cost approach for productivity losses due to deaths)				
Diabetes	\$908,321	\$7,301,887	\$97,754,016	\$105,964,224
Cardiovascular disease	\$1,464,821	\$7,076,414	\$15,527,810	\$24,069,046
Chronic respiratory disease	\$197,763	\$7,673,085	\$16,401,218	\$24,272,066
Neoplasms	\$510,518	\$2,866,041	\$3,353,225	\$6,729,784
Total for selected NCDs	\$3,081,424	\$24,917,427	\$133,036,270	\$161,035,120

1.5 Pathophysiology

Diabetes mellitus comprises a set of chronic metabolic disorders characterised by high blood glucose levels due to impaired insulin production, insulin resistance, or both. There are four main types:

Type 1 diabetes: This form arises from the autoimmune destruction of beta cells in the pancreas, leading to no insulin production. It represents 5% of all diabetes cases, influenced by autoimmune, genetic, and environmental factors, with no established prevention methods.

Type 2 diabetes: Making up 90% of diagnosed cases, type 2 diabetes occurs as the body develops resistance to insulin and fails to produce sufficient insulin to compensate. Initially, the body's inability to overcome this resistance leads to increased insulin production, which may eventually decline.

Gestational diabetes: This type affects some pregnant women and is characterised by glucose intolerance. It poses a higher risk for women who are obese, have a family history of diabetes, or have had gestational diabetes before, increasing their chances of developing type 2 diabetes by 20% to 50% after pregnancy.

Other specific types: These are caused by genetic defects in beta cell function, diseases affecting the pancreas, or exposure to certain drugs and chemicals.

Pre-diabetes, a precursor state, is marked by elevated glucose levels that do not meet the threshold for diabetes, encompassing conditions like impaired fasting glucose and impaired glucose tolerance. Managing blood sugar levels rigorously is crucial in all types of diabetes to prevent further health complications.

Type 1 diabetes accounts for 5% of all cases of diabetes. Its risk factors include autoimmune, genetic, and environmental factors. To date, there are no known ways to prevent type 1 diabetes. Type 2 diabetes accounts for 90% of all diagnosed diabetes cases. This form of diabetes generally begins as insulin resistance and, because the body is unable to produce enough insulin to address the resistance, the pancreas may reduce the production of insulin or eventually stop producing it. Minority women, women who are obese, women with a family history of diabetes, and women who have had gestational diabetes in a previous pregnancy are at higher risk than other women for developing gestational diabetes. Women who have had gestational diabetes have a 20% to 50% increased risk for developing type 2 diabetes later in life.

1.6 Incidence and prevalence

1.6.1 Global

In 2021, an estimated 529 million people globally were living with diabetes, according to a Global Burden of Disease study, indicating a global age-standardised prevalence of 6.1%. This figure closely aligns with the International Diabetes Federation's (IDF) estimate of 537 million adults aged 20–79 years with diabetes in the same year. The prevalence of diabetes has significantly increased from 321 million people aged 18 and older in 2010,

highlighting the growing burden of this chronic condition.

Regionally, diabetes prevalence varies substantially. North Africa and the Middle East reported particularly high rates, with countries like Iraq, Kuwait, Qatar, Bahrain, and Afghanistan experiencing age-standardised prevalence rates exceeding 10%. Oceania displayed the highest regional prevalence at 12.3%, with extreme rates observed in the Marshall Islands and American Samoa, where more than one in five adults are affected. In contrast, Eastern sub-Saharan Africa had the lowest regional prevalence at 2.9%.

Age-specific data reveal that diabetes prevalence exceeds 20% among all age groups between 65–95 years, peaking at 24.4% between ages 75–79. The highest prevalence within this age group occurs in North Africa and the Middle East, reaching 39.4%, and the lowest in parts of Europe and Central Asia at 19.8%. Notably, Oceania again reports the highest age-specific prevalence globally, with 43.0% in the 75–79 age group, and Qatar showing a staggering 76.1% prevalence in this demographic.

The disease also exhibits a sex-specific disparity in prevalence, being more common in males (6.5%) compared to females (5.8%), with a male-to-female ratio of 1.14. This ratio varies by region, being highest in high-income areas and lowest in Latin America and the Caribbean. In some regions like Central Sub-Saharan Africa, males have a 1.40 times higher prevalence than females, while in other areas like Central Latin America, Southern Sub-Saharan Africa, and the Caribbean, females exhibit a prevalence more than 10% higher than males. Interestingly, in 31.4% of countries, males have a lower prevalence than females, with significant differences noted in countries like Azerbaijan, Haiti, and Laos.

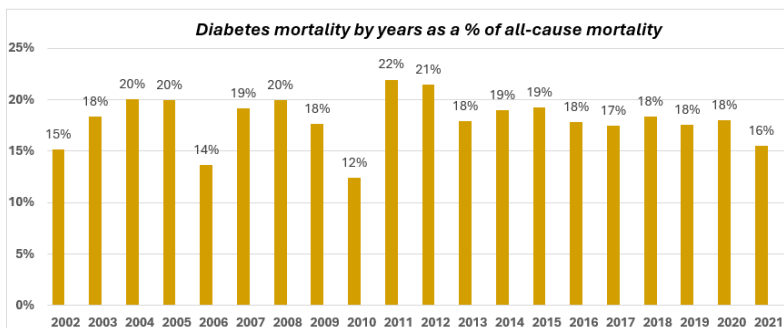
This global and regional variability in diabetes prevalence underscores the critical need for tailored public health strategies and interventions to address the escalating challenge of diabetes management and prevention worldwide.

1.6.2 Local

The 2011 STEPS yielded a prevalence rate of 14.6%. Fiji is embarking on its third round of STEPS in 2024, and a new prevalence figure is expected.

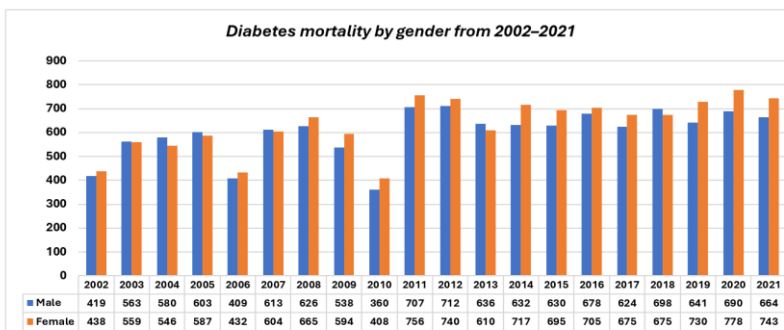
1.7 Diabetes mortality in Fiji

Figure 1. Diabetes mortality by years as a percentage of all-causes mortality



Diabetes mortality was on average 18% as a percentage of all-cause mortality over the 20-year period. The fluctuations seen may be due to reporting artefacts such as completeness of capture of data.

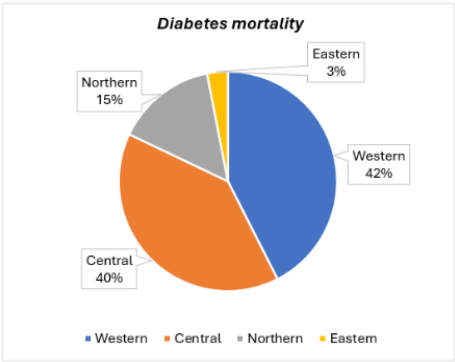
Figure 2. Diabetes mortality by gender from 2002–2021



On average, the male-to-female ratio was one. There was no significant difference in prevalence by sex, contrary to global trends where diabetes prevalence is seen to be higher in males versus females.

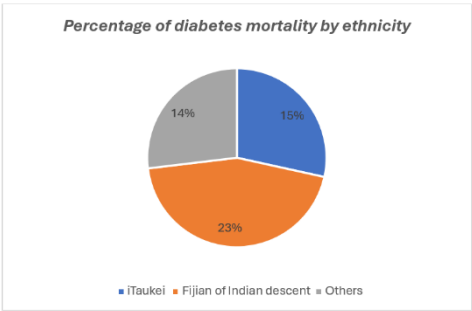
The greatest mortality was seen in the Western Division, followed by the Central Division, Northern Division and then the Eastern Division, following national population distribution.

Figure 3. Diabetes mortality by division



The mortality data shows that FID have the greatest mortality and this is not in line with the national population distributions and may need further research and granularity to understand what the cause of mortality is and what are the risk factors predisposing the population to mortality.

Figure 4. Percentage of diabetes mortality by ethnicity



1.7.1 Risk factors

The pathogenesis of diabetes is influenced by a range of factors, with distinct risk factors for type 1 and type 2 diabetes. For type 1 diabetes, risk factors include family history, ethnicity, and certain childhood viral infections. Type 2 diabetes, however, involves both non-modifiable and modifiable risk factors. Non-modifiable factors include age, race or ethnicity, genetic predisposition, history of gestational diabetes, and low birth weight, with diabetes incidence increasing with age. For instance, African Americans and Native Americans have higher diabetes rates compared to whites, with variations among Native American tribes.

Modifiable or lifestyle risk factors significantly impact the development of type 2 diabetes. These include high body mass index (BMI), physical inactivity, poor nutrition, hypertension, smoking, and alcohol use. A high BMI and increased waist-to-hip ratio are particularly strong predictors. Lower physical activity levels substantially increase diabetes risk, with studies showing that moderate activity can reduce this risk by about 30%. Diets including wholegrains, fruits and vegetable intake, specifically reducing the intake of refined carbohydrates and fats, plays a crucial role, and reducing alcohol use may lower the risk. Smoking is a known independent risk factor which can also contribute to the complications of diabetes.

Additional psychosocial factors like depression, stress, low social support, and poor mental health also contribute to higher diabetes risk. Recent findings suggest that adverse housing conditions may independently increase the risk of developing diabetes, although the exact mechanisms remain unclear.

1.8 Conclusion

Diabetes is recognised globally as a significant public health challenge, prompting the World Health Organization (WHO) to target it within its Global Action Plan for NCDs. In response, the WHO launched the Global Diabetes Compact in 2021 to enhance healthcare access for those living with diabetes.

WHO has identified diabetes as one of three target diseases in its *WHO Global Action Plan for the Prevention and Control of NCDs*, and the WHO Global Diabetes Compact was established in 2021 to improve access to health care for, and work closely with, those living with diabetes. Effective diabetes prevention and control requires investment in the systems approach: strong governance mechanisms for diabetes prevention and control; workforce with the right skills, capacity, quantity and placed at the right places; quality information systems enabling real-time data to inform decision-making at all levels; optimal equipment, medicines and technology to provide quality preventive and curative services; adequate financing and resourcing to aid the prevention and control strategies; and responsive service delivery systems which are effective and efficient in preventing, controlling and halting diabetes.

2.0 Introduction

Diabetes mellitus is defined as a metabolic disorder of multiple aetiology, characterised by chronic hyperglycaemia with disturbance of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion, insulin action, or both. However, while insulin defects mentioned are critical abnormalities, several other factors contribute to the hyperglycaemic state.

The major types of diabetes mellitus are:

1. Type 1 Diabetes
2. Type 2 Diabetes
3. Gestational Diabetes
4. Other types and conditions causing hyperglycaemia
 - a) Endocrinopathy (e.g., acromegaly, Cushing's syndrome)
 - b) Diabetes secondary to pancreatic disorders (e.g. cystic fibrosis, chronic pancreatitis, hemochromatosis, pancreatic carcinoma)
 - c) Maturity-onset diabetes of young (MODY)
 - d) Drug induced (e.g. glucocorticoids, antipsychotics, immunosuppressants, antiretrovirals)
 - e) Latent autoimmune diabetes
 - f) Genetic syndromes associated with diabetes (e.g. Down, Wolfram, Turner, myotonic dystrophy)

2.1 Recognition

Type 1 diabetes is characterised by progressive beta cell destruction, severe insulin deficiency, and the urgent need for insulin replacement therapy because of the risk of ketoacidosis and death. Patients are usually less than 30 years, but it can present in older patients. The onset of symptoms is more rapid, and ketones are usually present. At presentation, the patient with suspected type 1 diabetes should be immediately assessed to determine appropriate management. It is advisable to refer all such cases to the nearest hospital for the initial management.

Type 2 diabetes is common and is the predominant form of diabetes. It often goes undiagnosed for many years because the hyperglycaemia develops gradually and at early stages of the disease process it is often not severe enough for the patient to notice any of the classic symptoms of diabetes and indeed may have evidence of complications at diagnosis.

Gestational diabetes is diabetes developing for the first time in pregnancy. Its pathophysiology is similar to type 2 diabetes. The interpretation of blood glucose levels for diagnosis is more stringent compared to that of other types of diabetes. It may disappear after delivery but signals a high risk of developing diabetes in later life. Hence a close monitoring of such clients is essential.

Other forms of diabetes: If diabetes is suspected to be from any other cause, refer the patient to a tertiary health care facility for further evaluation.

There are a number of factors known to be associated with a higher risk of developing type 2 diabetes and any person with any of these factors should be screened for the diagnosis of diabetes. Population at higher risk include:

- Age above 30 years
- Overweight/obesity
- Family history of diabetes
- Hypertension
- Previous history of gestational diabetes mellitus (GDM)
- Dyslipidaemia
- Physical inactivity
- Macrovascular disease

A person, not known to have diabetes, presenting with the following symptoms (which are typical symptoms of diabetes) needs to have blood sugar tests done to establish the diagnosis of diabetes:

- Polyuria
- Polyphagia
- Polydipsia
- Weight loss
- Lethargy
- pruritus vulvae
- Balanitis
- Fatigue

Patients with the following conditions should be opportunistically screened for diabetes: foot sepsis, multiple abscesses, delayed wound healing, neuropathy, visual impairment or if a patient is sick enough to be hospitalised.

2.2 Diagnosis of diabetes mellitus

A firm diagnosis of diabetes is based on blood sugar levels. Urine testing is not reliable. ***Capillary blood glucose testing if used should be confirmed by venous blood testing.*** An overnight fasting blood sugar level is often preferred though random blood sugars can be used.

Two positive results on two different days are recommended. **A single positive result** is significant if there is unequivocal hyperglycaemia with metabolic decompensation or is accompanied with symptoms of diabetes. All newly diagnosed diabetic patients are to be registered through the Diabetes Notification standard form.

Table 2. Diagnostic criteria for diabetes mellitus

	Normal glucose tolerance	Hyperglycaemia	
	Normal	Pre-diabetes	Diabetes
Fasting blood sugar*	< 5.6 mmol/L (100 mg/dL)	5.6–6.9 mmol/L (100–125 mg/dL)	≥7.0mmol/L (≥126 mg/dL)
HbA1c	< 5.6% (38mmol/L)	5.7 to 6.4% (39 to 47mmol/L)	≥ 6.5% (48mmol/mol)
2-hour post load venous glucose	< 7.8 mmol/L (140 mg/dL)	7.8 – 11.0 mmol/L (140 – 199 mg/dL)	≥11.1 mmol/L (200 mg/dL)
Random plasma glucose (to be used only in the presence of symptoms)			≥11.1 mmol/L (200 mg/dL) With symptoms

* Overnight fast of 8–14 hours.

* The values above do not apply to pregnant mothers.

Blood glucose levels above the normal but below that which is diagnostic of diabetes, are not to be neglected as they constitute two very important entities called **impaired fasting glucose** (IFG) and **impaired glucose tolerance** (IGT), the management of which requires active lifestyle changes (non-pharmacological intervention – see under 3.3) to prevent the development of diabetes later in life. These individuals must be closely monitored with further blood glucose test results in six months' time.

3.0 The management of diabetes in adults

Diabetes in adults is mainly type 2 but type 1 diabetes can also occur. In a person known to have diabetes or one who has been newly diagnosed, the management aspect should not only focus on the control of blood sugars alone but be viewed as a package. The overall diabetic management requires a multifactorial approach to prevent the development of cardiovascular and microvascular disease. A practical approach to the management of type 2 diabetes in adults is considered below.

3.1 Clinical assessment

All diabetic patients require a thorough clinical assessment on initial visit, which includes a review of history, physical examination and relevant investigations as outlined below. Any further assessment thereafter will be less intensive but will depend on the clinical status of the patient at that stage.

Table 3. Clinical assessment of diabetic patients on initial visit

Review of history	Physical examination	Relevant investigations (Order and review investigations as indicated)
Severity of symptoms	Alertness and hydration	Full Blood Count: A low Hb may indicate an underlying chronic kidney disease
General health and intercurrent illness	Height and weight: Waist and Hip circumference (BMI & WHR calculated) Pallor	Blood biochemistry: urea, electrolytes, creatinine, lipid profile, FBS or RBS, HbA1c, liver function
Family history of diabetes	Vitals: Pulse and blood pressure (BP), Capillary blood glucose, respiration and temperature (if indicated). BP measurement should include any postural drop.	Urine ACR for micro-albuminuria (if test not possible, do dipstick for proteinuria)
First degree relatives with diabetes		
Social history: smoking history, alcohol, dietary habits, physical activity	Heart, lung and abdominal examination. Examination of the skin and extremities for oedema, injuries/infection, discoloration, peripheral pulsation and Neuropathy.	
Current medications and history of drug allergy	Visual acuity and fundoscopy examination of oral cavity for dental conditions Ketones – if warranted.	

3.2 Categories and referral recommendations

Category	Definition	Recommended action
0	People at risk of diabetes	Managed at health centres and nursing stations
1	Newly diagnosed	Refer to the Diabetic Hub Centre*
2	Established and well-controlled	Managed at health centres/sub-divisional level
3	Established and poorly controlled†	Refer to the Diabetic Hub Centre/sub-divisional hospital
4	Established with complications	Refer to the Hub Centre/divisional hospital
5	Established with complications and other conditions/complicated issues	Refer to divisional hospital

* Referral can also be done via phone call

† Refer to page 101 for targets for control

On initial assessment, patients should be screened for complications. If no complications exist, perform six-monthly screening. If complications exist, then refer to Chapters 5 and 6 in the guideline for management (pages 68–98).

3.2.1 Criteria for referral to higher levels of care

Figure 5. Criteria for referral to higher levels of care

Urgent (same day) referral should occur to a divisional hospital if one of the following is detected:
<ul style="list-style-type: none"> urine ketones >2+, or no improvement in glycaemia ≥ 18 mmol/L after management suspicion of ketoacidosis or HHS hypoglycaemia unresolved by treatment clinical suspicion of type 1 diabetes in newly diagnosed patient symptoms/signs of coronary heart disease and stroke recent deterioration of vision blood pressure >180/>110 mmHg with or without headache, shortness of breath, blurred vision, changed mental state, nausea, vomiting, reduced urine output infected foot ulcer with or without symptoms of systemic infection; gangrene critical limb ischaemia anuria or eGFR <30 mL/min/1.73 m².

Non-emergency referral should occur to the nearest Diabetic Hub or sub-divisional hospital if one of the following is detected:

- glycaemia treatment goal is not achieved despite compliance to treatment with oral medication (and insulin)
- eGFR 30–59 mL/min/1.73 m²
- moderately and severely increased albuminuria
- symptoms and signs of peripheral vascular disease
- blood pressure >130/80 mmHg despite treatment with two medications
- total cholesterol >7.5 mmol/L (310 mg/dL).

3.3 Non-pharmacological intervention (lifestyle management)

Modification of adverse lifestyle factors is an integral part in the management of all types of diabetes and in the prevention of diabetes. The important factors requiring attention include smoking, nutrition, alcohol, physical inactivity, stress and spirituality management (SNAPSS).

3.3.1 Smoking

In patients with diabetes smoking is an independent risk factor for cardiovascular disease. There is no safe level of smoking. Passive smoking is also detrimental. All patients who smoke and are suffering from diabetes must be encouraged to stop smoking or provided assistance to quit smoking.

Important advice to people wanting to quit smoking

Smoking is an addiction that has psychological and social triggers and cues. The best way to address this is by removing the triggers. The most common ones are:

- Kava/alcohol/cafeine/certain foods
- Stressful environments
- Other smokers, etc.
- Encourage the smoker to follow the 4Ds of smoking cessation:
 - ✓ Delay – When the urge to smoke hits, delay the act as much as possible and it will subside
 - ✓ Deep breathing – Get them to focus on their breathing and take deep breaths for 5 minutes
 - ✓ Drink water – have a glass of water and drink it slowly focusing on hydrating the mouth
 - ✓ Do something else – never underestimate the power of distraction. A short walk or watching a video on your phone will be enough to distract and remove the craving.

The combination of the above trigger management with nicotine replacement therapy would increase the chances of the person quitting tobacco use.

The referral pathway is shown in this video at this link <https://youtu.be/8XvQBc8JIMM> or use the QR code below:



3.3.2 Nutrition guideline for diabetes management

It is now widely acknowledged that dietary change and significant weight loss can result in remission of type 2 diabetes. Nutrition, physical activity, and behavioural therapy to achieve and maintain $\geq 5\%$ weight loss is recommended for most people with type 2 diabetes and overweight or obesity. Additional weight loss usually results in further improvements in the management of diabetes and CV risk.

Most of the burden of disease due to poor nutrition is associated with eating too much energy-dense and relatively nutrient-poor food, and eating too few micronutrient-dense foods, including vegetables, fruit and wholegrain cereals.

Key dietary themes for people with type 2 diabetes are eating for cardiovascular protection, glycaemic management and meal planning.

All patients should be offered and encouraged to seek advice on medical nutrition therapy by referral to a dietitian. The dietitian can help people address core issues around nutrition, such as achieving sustainable healthy eating patterns and, where appropriate, healthy body weight (loss) by reducing energy intake (portion control and type of food). They can also assist with recipe modification, changing cooking techniques, label reading, eating out and understanding of fad diets.

Glycaemic management and meal planning

To influence the glycaemic response after eating, meal plans need to consider both the amount and quality of carbohydrates eaten. The total amount of carbohydrate consumed (compared with other macronutrients or the glycaemic index of the meal) may be the major dietary factor that contributes to high postprandial blood glucose levels (BGLs). Eating low-glycaemic load foods instead of higher glycaemic-load foods may modestly improve glycaemic control. Low glycaemic index (GI) foods include dense root crops, wholegrain breads, rolled oats, lower fat milk and yoghurt, minimally processed (e.g. wholegrain, low GI) breakfast cereals, pasta, brown or unpolished rice, legumes and most fruits eaten with skin. Intake of high-

carbohydrate, low-nutrient-dense foods such as soft drinks, cakes and lollies should be confined to infrequent, small amounts to reduce the risk of weight gain and a worsening cardiometabolic profile.

There is evidence that nutrition education may be particularly important for the prevention of hypoglycaemia in people with type 2 diabetes on insulin or sulfonylureas. Consistent carbohydrate intake, and spaced, regular meal consumption, may help some patients manage BGLs and weight. Inclusion of snacks as part of a person's meal plan should be individualised and should be balanced against the potential risk of weight gain and/or hypoglycaemia.

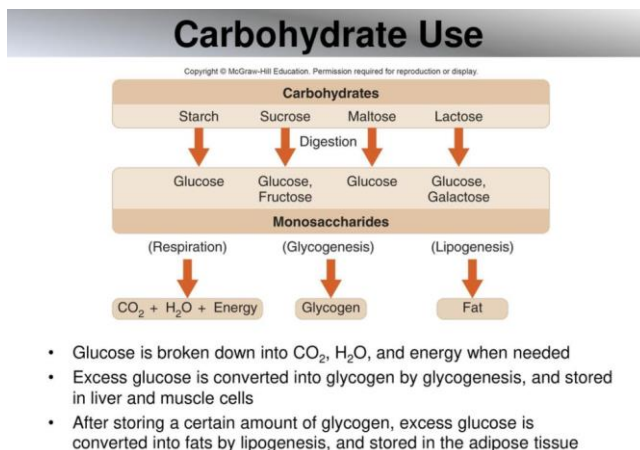
Nutrition plays a critical role in the management of diabetes. A well-balanced and appropriate diabetic diet can help regulate blood sugar levels, manage weight, reduce the risk of complications, and improve overall health. The dietary choices individuals make have a direct impact on their blood glucose levels, insulin sensitivity, and long-term health outcomes.

Nutrition is important in a diabetic diet:

- **Blood glucose control:** Balanced meals and snacks that include a combination of carbohydrates, proteins, and healthy fats can help control blood sugar levels. Carbohydrates (CHO) have the most significant impact on blood glucose levels, so monitoring and controlling carbohydrate intake is crucial.

First it is important to advise patients what happens to the carbohydrate food that is consumed:

Figure 6. How carbohydrates work in the body



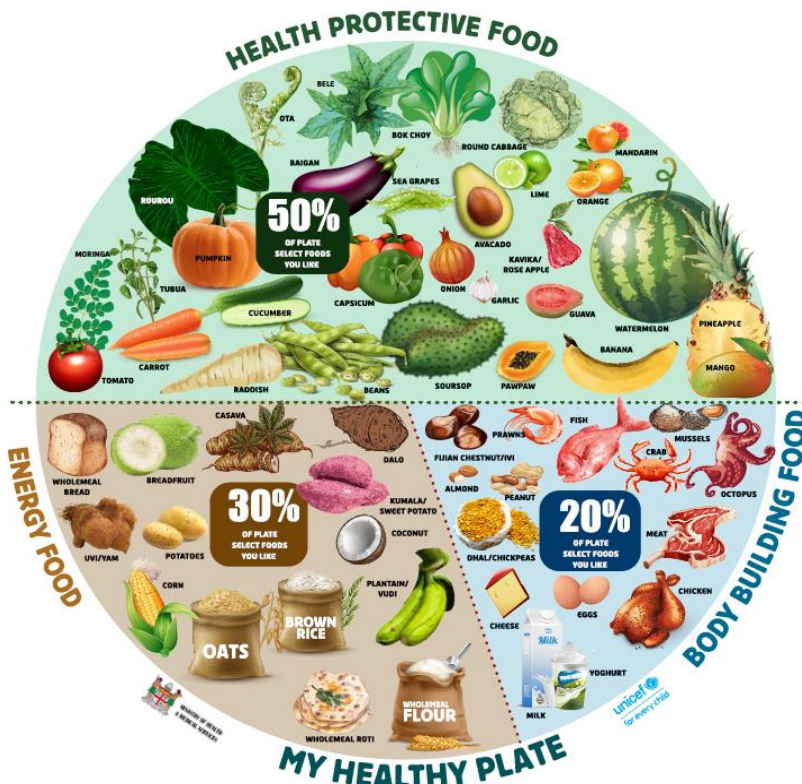
Carbohydrates that are consumed, are first converted to glucose, needed for energy, and excess glucose is stored as glycogen (glycogenesis) and fat (lipogenesis) in the body.

What is a balanced meal?

A healthy diet used in the treatment of diabetes is similar to a healthy

balanced diet. There is no need for a 'special' diet for diabetes. The amount of carbohydrates in a meal is the most important factor influencing blood glucose levels after a meal.

Figure 7. The three major food groups, healthy options and meal proportions



Five servings of vegetables and fruits are recommended; whereby three servings are non-starchy vegetables and two servings are fruit. A detailed list of 'free foods' and a glycaemic index of foods is available in the *Healthy Eating for Diabetes* booklet.

Suggestions to make healthy food choices:

- Eat regular meals to assist with managing energy and blood glucose levels.
- Carbohydrates have the most significant impact on blood sugar levels. Focus on complex carbohydrates such as whole grains, fruits, vegetables, and legumes, which have a lower glycaemic index and provide steady energy. Limit intake of refined carbohydrates like white bread, sugary snacks, and sugary beverages.
- Fill half the plate with a variety of vegetables or salads.
- Limit foods that are high in saturated fat and choose healthier fats.

- Include lean protein with your meals for example a palm-size fish and chicken. Legumes can also be used as a protein source.

Weight management: Relatively small weight loss (approximately 3–7% of baseline weight) improves glycemia and other intermediate CV risk factors. Larger, sustained weight losses (>10%) usually confer greater benefits, including disease-modifying effects, possible remission of type 2 diabetes, and may improve long-term CV outcomes and mortality. Maintaining a healthy weight is essential for managing diabetes. A diet that focuses on portion control and includes nutrient-dense foods can aid in weight loss or maintenance, which can improve insulin sensitivity and glucose control. It is important to educate patients on BMI and waist and hip ratio.

Heart health: Individuals with diabetes are at a higher risk of cardiovascular complications. A diet rich in fibre, whole grains, lean proteins, and healthy fats can help lower cholesterol levels and reduce the risk of heart disease.

Healthy fats

Table 4. Healthy fats

Monounsaturated fat	Olive oil, peanut oil, canola oil, avocado, nuts and seeds e.g. almonds and peanuts
Polyunsaturated fat	Soya bean oil, safflower oil, corn oil, cottonseed oil, nuts and seeds e.g. walnut and sunflower seeds
Omega-3 – fatty acid	Fish such as <i>walu</i> , mackerel, tuna, sardine, salmon

Unhealthy fats

Table 5. Unhealthy fats

Saturated fat	Animal product, coconut, palm
Trans fat	Partially hydrogenated vegetable oils, commercial baked goods (crackers, cookies, cake), fried foods
Cholesterol	Animal products (Red meat, like beef, pork, and lamb, as well as processed meats like sausage. Full-fat dairy, like cream, whole milk, and butter, egg yolk, and lard), seafood (crabs, prawns and lobsters),

Glycaemic index (GI): Foods with a high GI can cause rapid spikes in blood sugar levels. Monitoring the glycaemic index of foods can help individuals choose foods that have better impact on blood glucose levels.

What is the glycaemic load? The glycaemic load is based on glycaemic index but uses standard portion sizes rather than 100 grams of carbohydrate. The formula used for calculating glycaemic load is $GL = (GI \times \text{the amount of carbohydrate}) \div 100$.

So, if 237 millilitres glass of skim milk, which contains 12 grams of carbohydrate, has a glycaemic index of 46, the glycaemic load is:

$$GL = 46 \times 12 \div 100 = 5.52$$

Generally speaking, the ranking for glycaemic load is as follows:

- Low = 10 or less
- Medium = 11–19
- High = 20 or more

Remember, the lower the glycaemic load for a food, the lower the rise in blood glucose after it is eaten. Because the glycaemic load of a food looks at multiple components, the same food can be high on the glycaemic index but carry an overall low glycaemic load, so consult a dietitian for specific details.

Table 6. Glycaemic index for food items

FOOD ITEMS	Total CHO (g)/100g	Fibre	G/index	G/load
Dalo	26	4.1	70	17.4
Yams	28	4.1	51	13.7
Breadfruit	27	4.9	68	17
Sweet potato	20	3	46	7.8
Cassava	38	1.4	54	20.5
Noodles	25	2.5	53	13.25
Pasta	25	3.3	42	10.5
RICE				
Basmati – cooked	31	2.2	63	19.5
Parboiled – cooked	26	0.9	38	9.5
Brown rice – cooked	23	1.8	50	10.6
White rice	86.7	2.2	87	73
FLOUR				
White flour	76	2.7	71	52
Wholemeal flour	72	11	51	31
White bread	46.72	2.9	70	10
Oatmeal	21	10.1	58	12
Weet-Bix	69	10	69	47.6
VEGETABLES				
Potato	35	1.7	85	28
Sweet corn	31	3.7	62	19.2
Carrot	12.8	0.1	71	9.1
Pumpkin	7	1.2	75	5.25
FRUITS				
Apples	16	2	38	6
Oranges	12	2	48	6
Bananas	27	0.8	52	14
Watermelon	11	0.6	72	8
Pineapple	8	2.1	66	5.2
Pawpaw	9.12	2.5	60	9
Grapes	16.25	0.9	49	7
Mango	13.38	1.6	51	11
Mandarin	11.54	1.8	47	6

Source: PIFCT, <https://glycemicindex.com/>

Key

Low GI
Moderate
High

< 55
56-69
>70

Fibre intake: Including high-fibre foods like whole grains, vegetables, and

legumes can help regulate blood sugar levels, improve digestion, and provide a feeling of fullness, which can aid in weight management. Advise on green leafy vegetables.

Individualised approach: Diabetes management is not one-size-fits-all. Nutritional needs vary based on factors such as age, activity level, medications, and type of diabetes. **Working with a registered dietitian can help tailor a diet plan to individual needs.**

In summary, proper nutrition is a cornerstone of diabetes management. A well-designed diabetic diet can help control blood sugar levels, manage weight, and reduce the risk of complications. However, it is important to consult with healthcare professionals and registered dietitians to develop a personalised dietary plan that best suits an individual's needs and goals. Also keeping in mind this is a general diabetic diet guideline; for patients with DM and complications such renal impairment, post-op cases, wound management will require different planned diet.

For additional details on nutrition, please refer to the *Healthy Eating Guidelines for Diabetes, 3rd Revised Edition, Reprinted April 2024.*

3.3.3 Alcohol

All diabetic patients should be advised not to consume alcohol. The following advice is for diabetic patients who take alcohol:

- Alcoholic drinks contain sugar and will cause the blood glucose level to rise quickly.
- Extra energy (calories) can increase body weight.
- It can interact with diabetes medications.
- It can mask symptoms of hypoglycaemia.
- Other medical conditions may be worsened.

It is good to adhere to the recommended guidelines for alcohol. There are no guidelines in existence for Fiji but the Australian Alcohol Guidelines can be accessed on <https://www.nhmrc.gov.au/health-advice/alcohol> and <https://diabetes.org/health-wellness/alcohol-and-diabetes>

- AVOIDANCE OF ALCOHOL IS RECOMENDED FOR DIABETICS
- WOMEN WHO ARE PREGNANT AND BREASTFEEDING, CHILDREN AND PEOPLE UNDER THE AGE OF 18 YEARS SHOULD NOT DRINK ALCOHOL
- HOWEVER, FOR THOSE WHO DRINK ALCOHOL, AVOID BINGE DRINKING
- THE AMERICAN DIABETES ASSOCIATION RECOMENDS ONE (1)

Figure 8. Measures of standard alcoholic drinks



3.3.4 Diabetes physical activity programme

- Diabetes Guideline
- Physiotherapy
- Diabetes physical activity programme

Benefits of physical activity

In accordance with American Diabetes Association (ADA) 2016 *Diabetes Management Guidelines*, since exercise plays a key role in weight management, diabetic control and stress management, every diabetic client should be motivated to do some sort of exercise.

It is the ultimate goal of management to enable every patient attending foot clinics to be able to confidently perform their home exercises within safe measures, thus optimise their physical activity for control of diabetes mellitus. However, patients' general status and other ailments should be taken into consideration.

The following precautions are to be taken for patient with specific long-term complications of diabetes:

Table 7. Precautions for patients with long-term complications

Conditions	Precaution	Recommended [ADA]
Retinopathy [proliferative]	<ul style="list-style-type: none"> Avoid vigorous aerobics and resistance exercise as patients can bleed in the eye 	<ul style="list-style-type: none"> Light intensity exercise [Walking]
Peripheral neuropathy	<ul style="list-style-type: none"> At higher risk of foot deformities that increases the risk of callus and infection in addition to Charcot joint destruction Examine feet daily with proper footwear 	<ul style="list-style-type: none"> Moderate-intensity walking 150 mins/week
Autonomic neuropathy	<ul style="list-style-type: none"> Increased risk of exercise-induced injury or adverse event through decreased cardiac responsiveness to exercise, postural hypotension, impaired thermoregulation, impaired night vision due to impaired papillary reaction, and higher susceptibility to hypoglycaemia 	<ul style="list-style-type: none"> Consult a physician prior to any exercise
Albuminuria and nephropathy	<ul style="list-style-type: none"> Physical activity can acutely increase urinary protein excretion 	<ul style="list-style-type: none"> No exercise restrictions

Type 1 diabetes precautions

In accordance with American Diabetes Association (ADA) 2016 Diabetes Management Guidelines, there are three basic guidelines for diabetes exercise management:

- eating enough carbohydrates
- monitoring glucose before, during, and after exercise
- adjusting insulin as necessary.

Types of exercises vs T1 Diabetes

Table 8. Exercises for type 1 diabetes

Types	Intensity	Duration	Impact on blood sugar
-------	-----------	----------	-----------------------

Aerobics	Lower	Longer	Drop
Anaerobic	Higher	Shorter	Spike
Combination of both			Fluctuate

Paediatrics guideline: Please refer to Physical Activity Guideline 2023

Guidelines for preschool-aged children

- Preschool-aged children (ages 3 through 5 years) should be *physically active* throughout the day to enhance growth and development.
- Adult caregivers of preschool-aged children should encourage *active play* that includes a variety of activity types.

Guidelines for children and adolescents

- It is important to provide young people opportunities and encouragement to participate in physical activities that are appropriate for their age, that are enjoyable, and that offer variety.
- Children and adolescents ages 6 through 17 years should do 60 minutes (1 hour) or more of moderate-to-vigorous physical activity daily:
- Aerobic: Most of the 60 minutes or more per day should be either moderate- or vigorous-intensity aerobic physical activity and should include vigorous-intensity physical activity on at least 3 days a week.
- Muscle-strengthening: As part of their 60 minutes or more of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days a week.
- Bone-strengthening: As part of their 60 minutes or more of daily physical activity, children and adolescents should include bone-strengthening physical activity on at least 3 days a week.

Guidelines for adults

- Adults should move more and sit less throughout the day. Some physical activity is better than none.
- Adults who sit less and do any amount of moderate-to-vigorous physical activity gain some health benefits.
- For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity.
- Preferably, aerobic activity should be spread throughout the week.
- Additional health benefits are gained by engaging in physical

activity beyond the equivalent of 300 minutes (5 hours) of moderate-intensity physical activity a week.

- Adults should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.

Guidelines for older adults

The key guidelines for adults also apply to older adults. In addition, the following key guidelines are just for older adults:

- As part of their *weekly physical activity*, older adults should do multicomponent physical activity that includes balance training as well as aerobic and muscle-strengthening activities.
- Older adults should determine their level of effort for physical activity relative to their level of fitness.
- Older adults with chronic conditions should understand whether and how their conditions affect their ability to do regular physical activity safely.
- When *older adults cannot do 150 minutes* of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow.

Guidelines for women during pregnancy and the postpartum period

- Women should do at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic activity a week during pregnancy and the postpartum period.
- Preferably, *aerobic activity* should be spread throughout the week.
- Women who habitually engaged in vigorous-intensity aerobic activity or who were physically active before pregnancy can continue these activities during pregnancy and the postpartum period.
- Women who are pregnant should be under the care of a health care provider who can monitor the progress of the pregnancy.
- Women who are pregnant can consult their health care provider about whether or how to adjust their physical activity during pregnancy and after the baby is born.

Key guidelines for adults with chronic health conditions and adults with disabilities.

- Adults with chronic conditions or disabilities, who are able, should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity.
- Preferably, *aerobic activity* should be spread throughout the week.

- Adults with chronic conditions or disabilities, who are able, should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.
- When adults with chronic conditions or disabilities are not able to meet the above key guidelines, they should engage in regular physical activity according to their abilities and should avoid inactivity.
- Adults with chronic conditions or symptoms should be under the care of a health care provider.
- People with chronic conditions can consult a health care professional or physical activity specialist about the types and amounts of activity appropriate for their abilities and chronic conditions.

Key guidelines for safe physical activity

To do *physical activity* safely and reduce risk of injuries and other adverse events, people should:

- Understand the risks yet be confident that physical activity can be safe for almost everyone.
- Choose types of physical activity that are appropriate for their current fitness level and health goals, because some activities are safer than others.
- Increase physical activity gradually over time to meet key guidelines or health goals.
- Inactive people should “start low and go slow” by starting with lower intensity activities and gradually increasing how often and how long activities are done.
- Protect themselves by using appropriate gear and sports equipment, choosing safe environments, following rules and policies, and making sensible choices about when, where, and how to be active.
- Be under the care of a health care provider if they have chronic conditions or symptoms.
- People with chronic conditions and symptoms can consult a health care professional or physical activity specialist about the types and amounts of activity appropriate for them.

Guideline reference: *Physical Activity Guideline for Americans*, 2nd Edition (2018)

Physical activity recommendations:

- Prior to an exercise programme, please consult your doctor /physiotherapist for more details.
- Always remember to have a pre-warm-up and post-cool down session during a regime.

Before prescription of exercise:

1. Calculate cardiovascular risk [CRAM edition 2]
2. Prescribe physical activity as per their cardiovascular risk assessment
3. Patients with complications (amputees, bedridden, multiple medical complications) – tailor-made prescriptions.

Refer to table below for exercise guideline:

Table 9. An exercise guide using the FITT principle [Ref: Fiji CRAM Guideline, 2023]

Colour code	Frequency	Intensity	Time	Type
Green (<5%)	5 times/ week	Moderate - Vigorous	150 mins (10 mins bout)	Aerobic, Flexibility, Strengthening, Brisk Walking, Running, Zumba, Stretches, Weights, Pushups, DIPs, Active Transportation and Gardening
Yellow (5 to < 10%)	3–5 times/ week	Moderate	90–150 mins	Aerobic, Flexibility, Strengthening, Brisk Walking, Running, Zumba, Stretches, Weights, Pushups, Dips, Active Transportation, Gardening
Orange (10% to 20%)	3 times a week	Low– moderate	90 mins	Aerobic, Flexibility, Strengthening, Walking, Stretches, Wall Pushups, Active Transportation
Red (>20%)	3 times a week	Low	10 mins bouts/3 times a day	Chair exercises, Walking and gentle stretches. Bed mobility exercises (as appropriately tolerated).

Please note:

- The colour of the cell indicates the 10-year risk of a fatal or non-fatal CVD event.
- The value within the cell is the risk percentage.
- Colour coding is based on the grouping.

Precautions:

- Exercise prescriptions are individualised.
- The regime needs to observe the following:
 1. The physician will most likely adjust (decrease) the insulin dosage to accommodate exercise
 2. Consider gradual increase of physical activity towards the conditioning programme to accommodate adjustment to any existing cardiovascular impairment
 3. Persons with diabetes must eat a controlled amount of carbohydrates before exercising to prevent hypoglycaemia
 4. Care of the feet is essential therefore it is recommended to use proper and comfortable shoes with wrinkle-free socks to prevent blisters and trauma to lower extremities
 5. Do not allow clients to be over-fatigued.

REFERRAL PATHWAY: For enquires please visit the nearest Physiotherapy stations as tabled below:

Table 10. Referral pathways by divisions

NORTH	EAST	WEST	CENTRAL
Labasa Hospital	Levuka SDH	Lautoka Hospital	CWM Hospital
Labasa Health Centre	Lakeba SDH	Lautoka Diabetic Hub	Suva Health Centre
Seaqaqa Health Centre	Vunisea SDH	Lautoka Health Centre	Vunidawa Hospital
Savusavu Hospital	Rotuma SDH	Nadi Hospital/ Health Centre	Korovou HC
Nabouwalu Hospital		Tavua SDH	Nausori Health Centre
		Ba Hospital	Wainibokasi Hospital
		Ba Health Centre	Navua Hospital
		Sigatoka SDH	
		Keyasi SDH	
		Rakiraki Hospital	

3.3.5 Stress, diabetes and mental health

Stress and diabetes

Stress is a part and parcel of modern-day life. Stressors may be internal and external. Our body responds to stress either as fight or flight response and repeated stress may lead to failing rheostat phenomenon of hypothalamus leading to less efficient hormonal control through feed-backs. This leads to various changes in body functioning at various levels like cellular, organic or systemic and finally leads to various diseases.

Diabetes may be an outcome of stress and further sets in a vicious cycle of

stress-diabetes relationship. During stress, there is an increased demand for energy mainly from the body's stored fat and glucose. People under stress tend to neglect looking after themselves. They may forget to take their medications or fail to monitor their food choices or intake. They may sometimes feel discouraged, worried, frustrated, or tired of dealing with daily diabetes care, like diabetes is controlling them instead of the other way around.

Some people cope with stress by taking alcohol or decreasing their physical activities. Stress coping mechanisms are many and it depends on resources available with a wide range of personal variations.

People with diabetes should be counselled to:

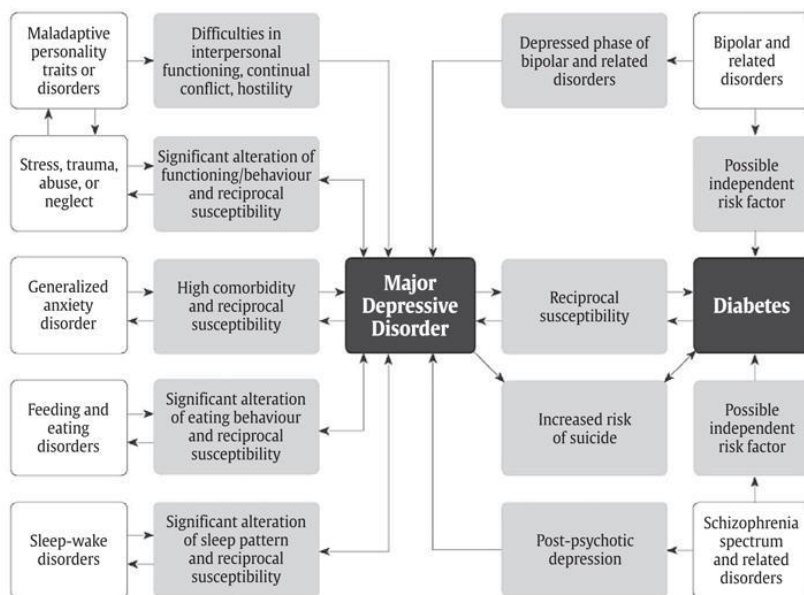
- Handle stress more positively
- Replace bad or negative thoughts with healthy ones
- Control the body's reactions to stress through
 - Relaxation techniques: like breathing exercises, yoga, meditation
 - Exercising or dancing
 - Simplify and reprioritise
 - Listening to calming music
 - Prayer, meditation and mindfulness
 - Talk to someone and share worries. It helps to see things in a different light. They may not be as bad as imagined
 - Start a hobby, learn new things!

Screening for common psychiatric comorbidities associated with diabetes

Psychiatric comorbidities in association with diabetes mellitus is common. Thus, individuals living with type 1 or type 2 diabetes are at increased risk for depression, anxiety, and eating disorder diagnoses.²⁰ This association can present in different patterns often leading to impaired quality of life, increased cost of care, poor treatment adherence (resulting in increased risk for serious short- and long-term complications viz. blindness, amputations, stroke, cognitive decline, renal failure, decreased quality of life, and premature death), poor glycaemia control and increased emergency room visits. Consequently, screening and managing psychiatric comorbidities associated with diabetes at the earliest is important.

The following diagram displays interplay between diabetes, major depressive disorder and other psychiatric conditions.

Figure 9. Interplay between diabetes, major depressive disorder and other psychiatric conditions



Common signs and symptoms of depression:

- continuous low mood or sadness
- feeling worthless, hopeless and helpless
- having low self-esteem
- feeling tearful
- feeling guilt-ridden
- feeling irritable and intolerant of others
- having no motivation or interest in things
- finding it difficult to make decisions
- not getting any enjoyment out of life
- moving or speaking more slowly than usual (Psychomotor retardation)
- changes in appetite or weight (usually decreased, but sometimes increased)
- unexplained aches and pains
- lack of energy
- decreased libido
- disturbed sleep – for example, finding it difficult to fall asleep at night or waking up very early in the morning
- avoiding contact with friends and taking part in fewer social activities
- neglecting your hobbies and interests
- having difficulties in personal, work or family life.

Common signs and symptoms of anxiety:

- Feeling nervous, restless or tense
- Having a sense of impending danger, panic or doom
- Having an increased heart rate
- Breathing rapidly (hyperventilation)
- Sweating
- Trembling
- Feeling weak or tired
- Trouble concentrating or thinking about anything other than the present worry
- Having trouble sleeping
- Experiencing gastrointestinal (GI) problems
- Having difficulty controlling worry
- Having the urge to avoid things that trigger anxiety
- having difficulties in personal, work or family life.

Assessment and diagnosis:

- For screening and rating severity PHQ-9 and Hamilton Anxiety Scale can be used for depression and Anxiety respectively (Scales Attached).
- Diagnosis can be reached using ICD-10/11 or DSM-5/ IV TR criteria.
- Ensure baseline blood results and do ECG to assess major organ function.

Diagnostic criteria for Major Depression (DSM-5):

- A. Depressed mood and/or loss of interest or pleasure in life activities for at least 2 weeks
- B. At least five of the following symptoms that cause clinically significant impairment in social, work, or other important areas of functioning almost every day.
 1. Depressed mood most of the day.
 2. Diminished interest or pleasure in all or most activities.
 3. Significant unintentional weight loss or gain.
 4. Insomnia or sleeping too much.
 5. Agitation or psychomotor retardation noticed by others.
 6. Fatigue or loss of energy.
 7. Feelings of worthlessness or excessive guilt.
 8. Diminished ability to think or concentrate, or indecisiveness.
 9. Recurrent thoughts of death.

HINT:

- Try to look for as many symptoms as possible
- Establish background of diabetes in this context.
- Rule out other possible causes, other medical illnesses, substance use/abuse, including medicines and pre-existing mental health problems.

Diagnostic Criteria for Generalized Anxiety Disorder (GAD) (DSM-5)

The presence of excessive anxiety and worry about a variety of topics, events, or activities. Worry occurs more often than not for at least six months and is clearly excessive.

The worry is experienced as very challenging to control. The worry in both adults and children may easily shift from one topic to another.

The anxiety and worry are accompanied by at least three of the following physical or cognitive symptoms (In children, only one of these symptoms is necessary for a diagnosis of GAD):

- Edginess or restlessness
- Tiring easily; more fatigued than usual
- Impaired concentration or feeling as though the mind goes blank
- Irritability (which may or may not be observable to others)
- Increased muscle aches or soreness
- Difficulty sleeping (due to trouble falling asleep or staying asleep, restlessness at night, or unsatisfying sleep)
- **Anxiety disorder due to a medical condition (for example diabetes)** includes symptoms of intense anxiety or panic that are directly caused by a physical health problem (DM in current context).

Management of depression

Mild depression:

- Step 1: Better sugar control, physical activity (yoga, walking) and dietary advice. No medications.
- Step 2: If there is no response to Step 1 in 6 weeks, start low-dose antidepressant (Fluoxetine 20 mg or Sertraline 25–50 mg once daily).

Moderate depression:

- Step 1: Start Fluoxetine 20 mg once daily in morning for 6 weeks. If good response, continue with the same dose.
- Step 2: In case of non-response or when the effect is plateaued, increase Fluoxetine to 40mg once daily for 6 weeks. If good response, continue with the same dose.
- Step 3: If no response, refer to a specialist.

Severe depression:

- Step 1: Refer to a specialist.

Prescribing antidepressant medications at primary health centre

Recommended antidepressants are:

1. Fluoxetine 20 mg initially for 4 to 6 weeks. In case of no response but good tolerance to medication increase to 40 mg for 6 weeks. If not responding to above dose and duration, refer to specialist. In case of good response, continue the treatment and monitor for any possible side effects.
2. Sertraline 25 mg initially. Increase to 50 mg after 3 weeks. In case of no response but good tolerance, increase to 75 mg after 6 weeks. If no response, refer to specialist. In case of good response, continue with treatment and monitor for any possible side effects.

Management of anxiety

Mild anxiety:

- Step 1: Better sugar control, physical activity (yoga, walking), dietary advice and counselling. No medications.
- Step 2: If no response, start with Clonazepam 0.25 mg twice daily and Sertraline 25 mg once daily in morning for 6 weeks. Taper off benzodiazepines within 3 to 4 weeks of treatment and continue with Sertraline 25 mg.
- Step 3: If no response, treat it as moderate.

Moderate anxiety:

- Step 1: Start Clonazepam 0.25 mg three times daily and Sertraline 25 mg once daily in morning for 4 weeks. Taper off benzodiazepines within 4 weeks of treatment and continue with Sertraline 25 mg in case of good response.
- Step 2: In case of non-response or plateaued response increase sertraline up to 50 mg and try to taper off benzodiazepines within 4 weeks.
- Step 3: In case of non-response after 6 weeks but good tolerance, increase Sertraline to 75 mg.
- Step 4: In case of good response continue above treatment and monitor for any possible side effects. If non-response or plateaued response, refer to specialist.

Severe anxiety:

- Step 1: Refer to a specialist.

(Note: Several other psychiatric conditions including delirium and psychosis can be associated or be present as comorbidity with diabetes. However, in such cases referral to a specialist is recommended)

Hamilton Anxiety Rating Scale (HAM-A)

Below is a list of 14 phrases that describe certain feelings that people have. Rate the patients by finding the answer which best describes the extent to which he/she has these conditions.

Select one of the five responses for each of the 14 questions: 0 = Not present; 1 = Mild; 2 = Moderate; 3 = Severe; 4 = Very severe.

1. **Anxious mood**
Worries, anticipation of the worst, fearful anticipation, irritability.
2. **Tension**
Feelings of tension, fatigability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax.
3. **Fears**
Of dark, of strangers, of being left alone, of animals, of traffic, of crowds.
4. **Insomnia**
Difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors.
5. **Intellectual**
Difficulty in concentration, poor memory.
6. **Depressed mood**
Loss of interest, lack of pleasure in hobbies, depression, early waking, diurnal swing.
7. **Somatic (muscular)**
Pains and aches, twitching, stiffness, myoclonic jerks, grinding of teeth, unsteady voice, increased muscular tone.

8.	Somatic (sensory) Tinnitus, blurring of vision, hot and cold flushes, feelings of weakness, pricking sensation.
9.	Cardiovascular symptoms Tachycardia, palpitations, pain in chest, throbbing of vessels, fainting feelings, missing beat.
10.	Respiratory symptoms Pressure or constriction in chest, choking feelings, sighing, dyspnoea.
11.	Gastrointestinal symptoms Difficulty in swallowing, wind abdominal pain, burning sensations, abdominal fullness, nausea, vomiting, borborygmi, looseness of bowels, loss of weight, constipation.
12.	Genitourinary symptoms Frequency of micturition, urgency of micturition, amenorrhoea, menorrhagia, development of frigidity, premature ejaculation, loss of libido, impotence.
13.	Autonomic symptoms Dry mouth, flushing, pallor, tendency to sweat, giddiness, tension headache, raising of hair.
14.	Behaviour at interview Fidgeting, restlessness or pacing, tremor of hands, furrowed brow, strained face, sighing or rapid respiration, facial pallor, swallowing, etc.

Scoring: Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0–56, where <17 indicates mild severity, 18–24 mild to moderate severity and 25–30 moderate to severe.

3.3.6 Spirituality

Spiritual beliefs are invaluable in the management of diabetes and other chronic health conditions. Spirituality refers to the meaning or purpose of one's life, a search for wholeness, and a relationship with a spiritual being or reality. Spirituality involves the search for meaning and purpose through which one establishes his/her relationship with time, oneself, others, and God. Individual spiritual beliefs may be expressed through religion or religious involvement, involving participation in an organised system of beliefs, rituals, and cumulative traditions. Spiritual beliefs and activities can impact the management of chronic conditions through two different pathways. First, it can assist in coping with chronic illnesses by providing support, confidence, and hope, and second, it can interfere with coping resources, especially when patients neglect self-care activities and rely on prayer and/or meditation to manage their illness. Empirical evidence demonstrates the relationship between spirituality and self-management of chronic diseases like hypertension and diabetes.

Self-care practices, such as healthy food adaptation, adequate physical activity, proper medication practices, and regular glucose monitoring enable patients to manage their diabetes effectively on their own. The significant link between spiritual beliefs and such self-care practices suggests that spiritual beliefs impact the choice of management strategies and can make a difference in the efficacy of management.

Many who find life help others in similar situations find life too.

Steps to spiritual health:

1. Believe in yourself.
2. Find the meaning or purpose of one's life. Every person despite their health has a purpose in life.
3. Seek religious intervention, is necessary, especially when you are at your lowest self-esteem.
4. Build your self-esteem by building your spiritual health. Get involved in religious activities that help build your spiritual health.
 - a) Quiet time
 - b) Meditation
 - c) Fasting (Ramadan, Daniel fasting)
 - d) Youth, women or men fellowship
 - e) Singing and praising
 - f) Sharing your testimony, especially with someone in the same situation
 - g) You can help others: sometimes knowing you are not alone in a struggle is all someone needs to get through a tough time
 - h) It reminds you of your lesson learned and your strength. No better way of embracing a lesson learned than to speak out
 - i) It keeps you grateful for the little things you have.
5. Involve in a community programme that makes an impact in individual life, this creates positive vibes and a positive mental attitude that relieves negativity and toxicity that harms your body.

3.4 Management of hyperglycaemia

The overall aim of glycaemic management is to minimise long-term complications while avoiding severe hypoglycaemic events. Results of various randomised trials in diabetic patients have shown that control of hyperglycaemia delays the onset and slows the progression of microvascular complications. However, its effect on macrovascular disease remains uncertain.

The first step in the control of hyperglycaemia is setting an appropriate glycaemic target in each individual. In younger patients with no complications of diabetes a near normal glycaemic target can be aimed for, while in older patients with cardiovascular disease and multiple vascular risk factors, a higher glycaemic target should be the goal. Intensive glucose control in the latter poses adverse effects from the multiple drugs used and the risk of hypoglycaemia. This can be documented in the personal Diabetes Record

Book issued to diabetic patients attending SOPD clinics.

Active lifestyle intervention (SNAPSS) should be pursued prior to introducing drug therapy as some type 2 diabetic patients may achieve satisfactory glycaemic targets without the use of drugs.

When to start pharmacological intervention for hyperglycaemia

- Uncomplicated newly diagnosed diabetic patients who are unable to control blood sugars with lifestyle intervention within 6 weeks.
- Newly diagnosed patients with diabetic complications.

The commonly used glucose lowering drugs in the management of diabetes are discussed below:

3.4.1 Biguanides

Metformin is the only drug of the biguanide group available on the Fiji Essential Medicine Formulary (EMF).

Mode of action: It lowers blood glucose by suppressing hepatic glucose production and increasing tissue sensitivity to insulin.

It should be considered as the first line treatment for all patients suffering from Diabetes Type2 diabetes and is the preferred drug in obese type 2 diabetic patients.

Metformin is available in long-acting form and in combination formulations with other oral diabetes medications. Metformin has positive effects in other metabolism-related diseases including polycystic ovary syndrome, non-alcoholic fatty liver disease, and HIV lipodystrophy.

It is cleared from the body predominantly by renal excretion. It accumulates in renal impairment and should be used with caution in patients with serum creatinine of more than 200 $\mu\text{mol/L}$ or eGFR of $<45\text{ml/min}$. When eGFR $<45\text{ml/min}$, reduce the doses of metformin up to 50%. It is contraindicated if eGFR $<30\text{ml/min}$. Patients receiving long-term metformin should have regular (at least six-monthly) monitoring of their renal function. It is safe in pregnancy and breastfeeding mother.

It can cause lactic acidosis by increase in glycolysis which can result in increased lactate production and also decrease hepatic uptake and utilisation of lactate for gluconeogenesis in situations such as ischaemic heart disease, congestive heart failure and renal impairment. Metformin therapy should not be used in patients with evidence of hypoxemia, dehydration, or sepsis. It should be stopped for 48 hours before surgery or administration of contrast radiography and only resumed once urine output and renal function have returned to acceptable level as stated above. There is no risk of hypoglycaemia when used alone.

Adverse effects: Its major adverse effects are anorexia, nausea, abdominal discomfort and diarrhoea. Up to 30% of patients will have decreased absorption of vitamin B12, with decreased levels detected as early as 4 months of therapy, and symptomatic deficiency developing after 5–10 years.

Doses: Metformin is given orally 2–3 times a day and taken with or after

meals to avoid gastric intolerance. The dose varies from 500 mg daily to a maximum of 3 g/day in divided doses. Most physicians limit the dose to 2 grams daily because, at higher doses, gastrointestinal side effects are more common. It is advisable to begin with a smaller dose to start with and increase the dose gradually to facilitate compliance; otherwise, the development of gastrointestinal side effects will stop the patient from taking the drug.

3.4.2 Sulphonylureas

One of these compounds, *Glipizide*, is available on the Fiji EMF. They act on the pancreatic beta-cells and induce insulin secretion.

Glipizide is the most rapidly and short acting sulfonylurea. Its potency and intrinsic activity are in the same range as those of glibenclamide. It is cleared by the liver and the kidneys. Renal insufficiency does not seem to alter the elimination rate of glipizide and it is the recommended drug in older patients and in patients with renal impairment. It is more rapidly absorbed when taken before breakfast than when ingested together with breakfast and intake before breakfast is also associated with a more appropriate timing of insulin release relative to the meal, and with an enhanced efficacy of the drug. They can be combined with metformin if the diabetes control is inadequate.

Doses: It should be in the range of 2.5–10 mg daily, either as a single morning dose half an hour before breakfast or divided in a morning and an evening dose. Maximum doses 40mg/day in divided doses.

These drugs are not recommended in pregnancy and for lactating mothers.

Gliclazide is an oral hypoglycaemic drug and is classified under the sulphonylurea group of drugs. It is used when diabetes is not controlled with lifestyle modifications or when insulin therapy is not required. It is metabolised by the liver and is contraindicated in severe hepatic and renal dysfunction. It is available as an immediate release tablet, 80 mg strength, or as a Modified Release (MR) formulation, 30mg and 60 mg strength. The initial dose is 40–80 mg daily and is adjusted according to response up to 160 mg as a single dose; higher doses are divided and given twice daily. The maximum dose is 320 mg daily. The MR preparation dosage varies from 30– 120 mg once daily at breakfast.

Glimepiride is a sulphonylurea anti-diabetic medication. It may be used alone or with other anti-diabetic medications. The usual dose is 1–2 mg with breakfast, it is given once daily. Further dosage adjustments are made every two weeks as required. The maximum dose per day is 8 mg.

Adverse effects of Sulphonylureas

1. Hypoglycaemia
2. Weight gain

Contraindications of Sulfonylureas

The following patients should not be treated with sulfonylureas:

- 1) patients with type 1 diabetes or “pancreatic” diabetes

- 2) pregnant women (only glyburide treatment is acceptable)
- 3) patients with severe infections, stress, or trauma
- 4) patients with a history of severe adverse reactions to sulfonylureas
- 5) patients who are particularly prone to develop hypoglycaemia, e.g. liver or kidney disease
- 6) Patients on anti-TB medications (drug interaction with Rifampicin. It lowers the efficacy of Rifampicin).

Gliclazide and *Glimepiride* are not available on Fiji EMF but can be obtained from retail pharmacies.

3.4.3 Dipeptide peptidase 4 inhibitors (DPP-4 inhibitors)

DPP-4 Inhibitors are indicated for management of type 2 diabetes mellitus. It acts by inhibiting Dipeptidyl peptidase-4, thereby, increasing the concentration of the incretin hormones (glucagon-like peptide-1 and glucose-dependent insulintropic polypeptide), which increases glucose.

Medicines in this class include Sitagliptin, Linagliptin, Vildagliptin Saxagliptin/insulin regimen

and Alogliptin. These medicines are not the drug of choice for starting treatment. These medicines can be used as monotherapy, however, combination with insulin/Metformin/Sulphonyl urea have showed slightly more reduced HbA1c. Combination therapy may increase risk of hypoglycaemia and may need to reduce sulphonylurea/insulin dose. There is an increased risk of Angiotensin-converting enzyme (ACE) Inhibitor induced angioedema when used in combination with ACE inhibitors.

Contraindications of DPP4 inhibitors:

- Pancreatitis
- Angioedema
- Hypoglycaemia
- Pregnancy and breast feeding

DPP4 inhibitors:

Table 11. DPP4 inhibitors

Medicine	Sitagliptin	Linagliptin	Vildagliptin	Saxagliptin	Alogliptin
Administration	Oral	Oral	Oral	Oral	Oral
Dose	50 mg to 100 mg tablet once daily	5mg tablet Once daily	50mg tablet once or twice daily	5mg tablet once daily	25mg tablet once daily
Excretion	Via kidney (80%)	Via liver (84%)	Via Kidney (84%)	Via kidney (51%-75%)	Via Kidney (71%)
Metabolism	Low	Low	High	High	Low
Dose adjustment	eGFR>45 does not require dose adjustment, eGFR 30-45 50mg daily, eGFR<30 25mg daily	Does not require dose adjustment	eGFR >50 no need dose adjustment eGFR <50 50mg tab daily	eGFR>50 5mg tab once daily. eGFR< 50 2.5mg tablet once daily.	eGFR>50 does not require dose adjustment. eGFR 30-50 12.5mg once daily eGFR<30 6.25 mg once Daily
Adverse effect	Headache Constipation Itching	Constipation Vertigo	Nausea Headache Vertigo	Vertigo Fatigue	Headache Itching Vertigo

There are combinations of DPP 4 inhibitors with Metformin and Sulphonylureas. e.g. Metformin + Sitagliptin and Metformin + Linagliptin. Metformin + Vildagliptin. This combination tablet can be used once or twice daily depending upon its strength.

3.4.4 Sodium-glucose co- transporter 2 inhibitors (SGLT2 inhibitors)

This class of medicine is indicated for type 2 diabetes. It is available as Dapagliflozin, Empagliflozin, and Ertugliflozin or in combination with metformin/ Linagliptin/ Sitagliptin. It acts by inhibiting sodium- glucose co-transporter 2, reducing glucose absorption in the kidney (and increasing its excretion in the urine).

SGLT2 inhibitors have been proven to provide significant cardiovascular and renoprotection and are a preferred agent for patients with any of the following:

- established cardiovascular disease
- high risk of cardiovascular disease
- chronic kidney disease
- heart failure

In such patient groups SGLT2i can reduce the risk of kidney disease progression by almost 40%, the risk of AKI by 23% and lowers the risk of cardiovascular death or hospitalisation for heart failure by 23%.

SGLT2 inhibitors have very little risk of hypoglycaemia but may increase the risk of hypoglycaemia when used as combination therapy, therefore, dose reduction of sulphonylurea/insulin may be required. ***SGLT2 inhibitors should not be used in pregnancy.*** SGLT2 inhibitors have diuretic effect (osmotic) and other regular diuretic medications may need to be adjusted accordingly. Both men and women may be more likely to get a genital fungal infection.

In case of acute serious illnesses, prolonged fasting, bowel preparation, low-carbohydrate intake, excessive alcohol intake or other risk factors for ketoacidosis, SGLT2 inhibitors may need to be withheld due to risk of euglycemic ketoacidosis. SGLT2 inhibitors should be stopped 3 days before surgery, due to perioperative risks such as dehydration, UTI and renal impairment, and the potential for an increased risk of ketoacidosis. It can be restarted when patient is eating and drinking normally. If symptoms suggestive of ketoacidosis (e.g. unexplained severe vomiting and abdominal pain) or high anion gap metabolic acidosis occur, stop the SGLT2 inhibitors and consider testing blood ketones, even if glucose appears normal. Urine will test positive for glucose when taking this medicine.

SGLT2 inhibitors

Table 12. SGLT2 inhibitors

Medicine	Dapagliflozin	Empagliflozin	Ertugliflozin
Administration	Oral	Oral	Oral
Dose	5–10 mg tablet once daily	10–25mg once daily	5–15mg once daily
Combined dose	Dapagliflozin/ Metformin 10/500 mg or 10/1000 mg once daily with or after meals	Empagliflozin/Linagliptin – 10/5 mg to 25/5 mg once daily; With metformin: 1 tablet (of any strength) twice daily with or after meals	Ertugliflozin/Sitagliptin – 5/100 mg to 15/100 mg once daily; With metformin: 1 tablet (of any strength) twice daily with or after meals
Excretion	Via kidney (75%) and faecal (21%)	Via kidney (54.4%) and faecal (42.1%)	Via faecal (33.8%) and kidney (1.5%)
Dose adjustment	No adjustment required Use if eGFR >20, but once started can continue until dialysis. This cut off is likely to be lowered as new evidence becomes available	No adjustment required Use if eGFR >20, but once started can continue until dialysis. This cut off is likely to be lowered as new evidence becomes available	No adjustment required Use if eGFR >20, but once started can continue until dialysis. This cut off is likely to be lowered as new evidence becomes available
Contraindication	Type 1 diabetes, dialysis, severe, hypersensitivity	Type 1 diabetes, dialysis, severe, hypersensitivity	Type 1 diabetes, dialysis, severe, hypersensitivity
Adverse effect	Frequent urination, genital mycotic infection, vomiting, thrush, headache, sweating, breathlessness.	Frequent urination, genital mycotic infection, skin rash, dizziness.	Frequent urination, genital mycotic infection, back pain, headache.

3.4.5 Other oral anti-diabetic drugs

Thiazolidinediones: Two commonly used drugs are *Pioglitazone* and *Rosiglitazone*, the former is preferred because of better side effect profile. The common side effect of these drugs include oedema, weight gain and precipitation of heart failure, hence these drugs are contraindicated in heart failure. Risk of fracture should be considered in the long term in females treated with pioglitazone. They increase tissue sensitivity to insulin. *Pioglitazone* can be used as monotherapy but can be combined with dual or

triple therapy in combination with *metformin*, *sulphonylurea* or *insulin*. The dose of *pioglitazone* is 15–30 mg as a single dose.

Alpha glucosidase Inhibitors: These are oral glucose lowering agents that inhibit alpha glucosidase enzymes in the brush border of the small intestine. These enzymes convert complex carbohydrate in the intestine to simple sugars for absorption. The drug available in this group is *Acarbose*. It can be used as monotherapy or combined with other oral anti-diabetic medications including insulin. The common side effects include abdominal discomfort because of fermentation of undigested carbohydrate by colonic bacteria. Hypoglycaemia does not occur. It is not recommended in chronic intestinal disease, intestinal obstruction and cirrhosis. Smaller doses are recommended in renal and hepatic dysfunction. *Acarbose* comes as 25 mg, 50 mg and 100 mg tablets. Start the dose with 25 mg three times a day to 100 mg TDS as required. It should be taken with the first bite of a meal.

There are other anti-diabetic medications which are not available in Fiji. These include *glucagon-like peptide-1 agonists (GLP-1)*.

Glucagon-like peptide-1 agonist (GLP-1): It is a class of injectable hypoglycaemic drugs used for the treatment of type 2 diabetes and obesity. GLP-1 are also known as incretin mimetics or GLP-1 analogues. It stimulates beta cell of pancreas to secrete more insulin after eating. They also slow the rate of absorption of nutrients into the blood stream by reducing gastric emptying and may directly reduce food intake. They also inhibit Glucagon release from the alpha cells of the islets of Langerhans of pancreas.

Examples of this group of drugs:

- **Exenatide injectable extended release** – The recommended starting dose is 5 µg twice daily SC injection after 4 weeks. The maintenance dose for most patients is 10 µg twice daily, unless adverse events suggest continuing at the lower dose 2mg SC injection once weekly dose. Dose reduction in moderate renal impairment if eGFR between 30–50 ml/min. Exenatide is contraindicated if eGFR < 30 ml/min.
- **Liraglutide** – It is injectable form for subcutaneous use. Starting dose 0.6mg SC daily, the dose can be increased to 1.2mg after one week. The dose may be increased to a maximum of 1.8mg once daily. However, increasing the dose is not expected to greatly improve glycaemic control, slightly more weight loss may be expected at the higher dose.
- **Semaglutide** – The only GLP -1 agonist has injectable and oral form. Injectable form available 0.25 mg, 0.5 mg, 1 mg and 2 mg dose. The starting dose 0.25 mg SC once weekly for 4 weeks, then increase to 0.5 mg weekly. If necessary, after at least 4 weeks the dose may be increased to a maximum of 1mg once weekly. Oral Semaglutide – 3 mg, 7 mg and 14 mg tablet. Dose – one tablet daily.
- **Albiglutide** – The starting dose 30 mg once weekly which may be increased to a maximum of 50 mg weekly.
- **Dulaglutide** – The Starting dose 0.75 mg SC once weekly which may increase to a maximum of 1.5 mg weekly.

For weight loss:

- Liraglutide and Semaglutide commonly use approved by FDA. The starting dose is 0.6 mg once daily for first week, the dose then gradually increase to maximum of 3 mg once daily.
- Semaglutide is also administered 0.25 mg once weekly for 4 weeks; the dose is increased incrementally every week with a maximum of 2.4 mg once weekly.

Adverse effects: Nausea, vomiting and diarrhoea, feeling of early satiety. The GI side effect is dose depended. It is not causing hypoglycaemia. If hypoglycaemia is reported it is due to concomitant use with insulin or sulfonylureas. Injection site reaction and erythema may be reported.

Contraindications of GLP-1 receptor agonist:

- Patients with hypersensitivity to the drugs
- Pregnancy
- Gastroparesis and inflammatory bowel disorders
- Family history of medullary thyroid cancer or patients with Multiple Endocrine Neoplasia Syndrome Type 2 (MEN-2)
- Renal impairment if eGFR < 30ml/min
- History of pancreatitis

3.4.6 Insulins

There are five types of insulin preparations available in the market but only three types of insulin preparations available on the Fiji EMF. The usage of these preparations is discussed later.

Insulin is given using conventional disposable insulin syringes. Insulin pens and pre-filled syringes are expensive options and are available only in the private sector.

Table 13. Types of insulin, administration and availability

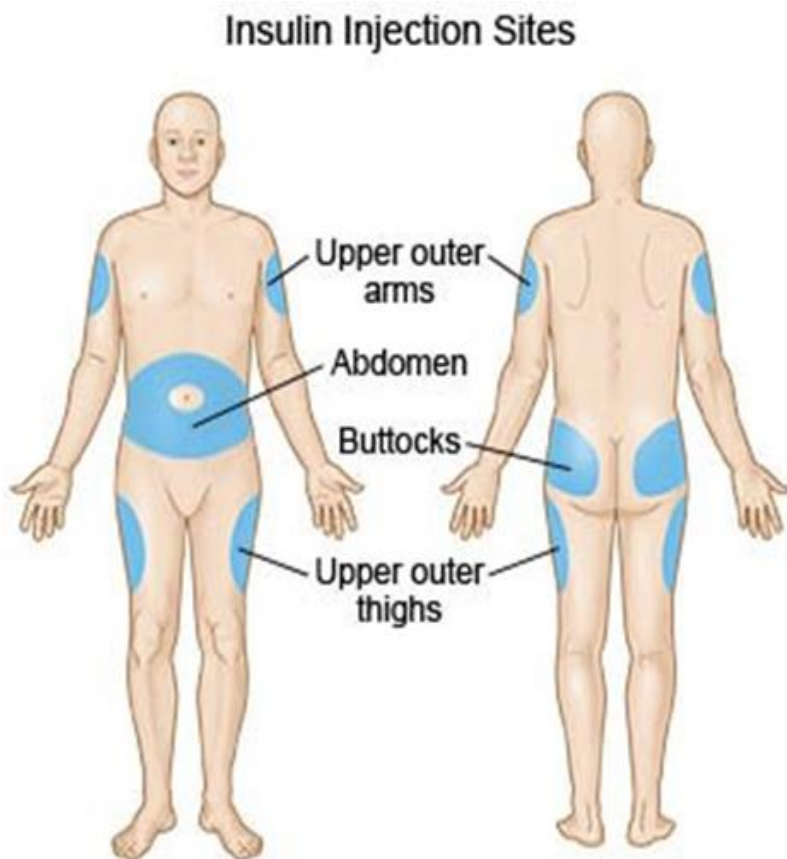
TYPES OF INSULIN	ONSET	PEAK	DURATION OF ACTION	EXAMPLE	AVAILABILITY
Rapid acting	15 min	1 hour	2–4 hours	Humalog	Not available in FPBS
Regular or short-acting	30 min	2–3 hours	3–6 hours	Soluble insulin	Available in FPBS
Intermediate acting	1–2 hours	2–12 hours	12–18 hours	Isophane insulin	Available in FPBS
Long acting	2–4 hours	No peak	20–24 hours	Glargine	Not available in FPBS
Mixed or biphasic insulin	30 min	1–4 hours	12–24 hours	Mixtard insulin	Available in FPBS

Site of insulin injection: The preferred sites of injection are the abdominal wall, the deltoids and the thighs. In the abdominal wall absorption of Insulin is faster than other sites. It is **recommended** that these sites be rotated regularly. Injecting the insulin in the same area may cause hard lumps.

- Abdomen – most preferable site because insulin arrives in the blood very quickly. Rotate the site in the abdomen right and left, up and down. Do not inject insulin in exactly the same place. Injecting the insulin in exactly the same area may cause hard lumps and skin thickening.
- Upper arms – outer area of the arm. Always rotate the site.
- Thighs – outer area of thigh. Always rotate the site.
- Upper buttocks – insulin absorbs less quickly than other areas.

Advise your patients not to inject cold insulin. Injecting cold insulin may sting, be painful and take longer time to work. Your patients can warm up insulin by gently rolling the insulin in between the palm. Do not use any insulin after the expiry date.

Figure 10. Insulin injection sites.



Source: Drug.com, 2022

Insulin storage: Insulin vials or insulin pens should be stored in the refrigerator at 2 to 8 degrees centigrade temperature until their date of expiry. Do not store Insulin on the refrigerator door, freezer, direct sunlight or glove compartment of the car.

Those patients who do not have a refrigerator at home, advise the patients to take normal tap water in a small container and drop insulin vial in water. Need to change the water 1–2 hourly. Do not collect more than one vial of insulin if

you do not have a refrigerator at home.

Travelling with insulin: Advise your patients to keep insulin in a cool place. Patients should store insulin in an Insulated bag or thermos flask to protect it from extreme temperatures. If your patients are travelling by plane, they should keep insulin and essential supplies in their hand luggage. It should not be in extreme temperatures, including the baggage compartment of the plane. Patients can give their insulin to cabin crew to keep it in the refrigerator.

Syringe disposal: Advise your patients to recap the used syringe and dispose of it in the sharp disposal containers.

Side effects of insulin: Weight gain, hypoglycaemia, lipohypotrophy, pain/itchiness/bleeding or bruising at injection site.

Insulin pens: These are insulin delivery devices available in many different brands and models, mainly for personal use. They generally fall into two groups: reusable pens and disposable pens.

Reusable insulin pens are loaded with an insulin-filled cartridge before use and replaced by another cartridge when empty. Set of five (5) replaceable cartridges are usually available with each cartridge containing either 150 or 300 units of soluble, intermediate or mixed insulin. Needles are available separately.

Some reusable pens include a memory function, which can recall dose amounts and timing. Connected insulin pens are insulin pens with the capacity to record and/or transmit insulin dose data. Insulin pen caps are also available and are placed on existing insulin pens and assist with calculating insulin doses. Some connected insulin pens and pen caps can be programmed to calculate insulin doses and provide downloadable data reports. These pens and pen caps are useful to people with diabetes for real-time insulin dosing and allow clinicians to retrospectively review the insulin delivery times and in some cases doses and glucose data to make informed insulin dose adjustment.

Disposable insulin pens come filled with insulin and are discarded when empty. Needles are available separately and disposable pens may be available in sets of five (5).

There are advantages and disadvantages of using the insulin pens:

Some advantages are that they are discreet, user friendly, insulin is pre-filled, and pens are easily portable and convenient for injections away from home.

Some disadvantages are that the pens may be more expensive, not all types of insulin may be available, and they do not allow mixing of insulin.

For more information refer to:

<https://diabetes.org/about-diabetes/devices-technology/insulin-pens>

<https://www.youtube.com/watch?v=OvTOx3FZyU>

Figure 11. Insulin pens are now available in many styles. Source: www.insulinpens.com



Insulin pumps (also known as continuous subcutaneous insulin infusion therapy): These are small computerised insulin delivery devices which can be worn on the belt or kept in the pockets of patients. The pumps allow for a continuous flow of rapid-acting insulin into the body through a catheter inserted under the skin of the abdomen. The insulin pump is designed to deliver a continuous amount of insulin, 24 hours a day according to a programmed plan unique to each pump wearer. The amount of insulin delivered can be changed by the user. The insulin pump is an alternative to multiple daily injections for intensive insulin therapy (which includes frequent blood glucose monitoring as well). The pumps also have the capability of recording the history of insulin delivery and this could be downloaded onto a computer for analysis.

In recent times insulin pump technology is being combined with continuous blood glucose monitoring systems. When the feedback loop is complete (insulin delivery based on feedback of the blood glucose level) the system may function as artificial pancreas. Insulin Pumps should be offered for diabetes management to youth and adults with type 1 diabetes A and other types of insulin deficient diabetes who are capable of using the device safely (either by themselves or with a caregiver). The choice of device should be made based on the individual's circumstances, preferences, and needs.

Complications of insulin pumps: Complications of the pump can be caused by issues with infusion sets (dislodgement, occlusion), which place individuals at-risk for ketosis and DKA and thus must be recognised and managed early. Skin issues included lipohypertrophy or, less frequently, lipatrophy and pump site infection.

For more information refer to:

- <https://www.webmd.com/diabetes/insulin-pump>
- https://en.wikipedia.org/wiki/Insulin_pump
- <https://www.medtronic-diabetes.com.au/>

Note: Very small numbers of patients in Fiji are using insulin pens and even fewer may be using the pump. However, visitors to the country may be using these devices and may seek your advice or help.

Insulin treatment in type 2 diabetes

(i) Indications

Failure of oral hypoglycaemic agents – insulin therapy should not be delayed. Early treatment delays complications and preserves beta cell function.

- The early introduction of insulin should be considered if there is evidence of ongoing catabolism (weight loss), if symptoms of hyperglycaemia are present, or when A1C levels (>10% [86 mmol/mol]) or blood glucose levels (>300 mg/dL [16.7 mmol/L]) are very high. (ADA)
- Patients undergoing major surgery and major invasive procedure e.g. angiography
- Critically ill patients
- Pregnancy

(ii) Administering insulin with oral hypoglycaemic drugs

As outpatient treatment initiate with Mixtard insulin 0.3 u/kg/day in two divided doses before breakfast and dinner. If patients reacted to Mixtard or prefer isophane then initiate isophane 0.5u/kg/day in two divided dose. Follow up the patients every 3–5 days for insulin adjustment. Titrate Insulin 3–5 unit/dose until your target glucose level achieved. When the target blood glucose level is achieved, maintain your insulin doses.

Oral hypoglycaemic agents should not be stopped with the commencement of insulin therapy though adjustments can be made as required specially sulphonylurea because of the risk of hypoglycaemia with insulin. Once the target glucose level is achieved consider stopping sulphonylurea.

(iii) Insulin regimens

- (a) Multiple-dose (“QID”) regimen: This regimen is more suited for stabilisation of blood sugar for inpatients.
 - *Soluble insulin* starting with 5 units subcutaneously 30 minutes before each meal, AND
 - *Isophane* 8 units subcutaneously twice a day.

Insulin doses should be adjusted based on the blood sugar levels.

(b) Twice-daily regimen

This regimen can be used for control of blood sugar for both inpatients and outpatients.

- Mixtard insulin 70/30, starting with 10 units in the morning and 5 units in the evening subcutaneously 30 minutes before meals. Adjust insulin dose to control blood sugars.
- If mixed insulin preparation is unavailable, then use: Isophane insulin 10 units in the morning and 5 units in the evening subcutaneously 30 minutes before meal. Doses are adjusted to control the blood sugar levels.

In principle, two-thirds of the insulin dose should be administered in the morning and one-third in the evening. However, insulin doses should be adjusted based on the blood sugar levels and increments of 5 units per dose are recommended. If blood sugar level remains uncontrolled then contact the medical registrar at your divisional hospital.

NOTE:

- For both insulin regimens, extra soluble insulin 5 units subcutaneously can be given if blood sugars are not controlled.
- For patients that are still uncontrolled despite high doses of insulin with or without oral hypoglycaemic agents, insulin resistance should be suspected and consultation with the specialist is required.
- In the management of patients with renal failure be mindful of the side effects of hypoglycaemia with any of the above listed medications.

Weight management and insulin: People taking insulin can manage their weight by making lifestyle changes, such as eating more healthily and exercising more regularly. Advise patients on the following:

- **Eat fewer calories:** Avoid skipping meals, but choose baked, broiled, or grilled foods instead of deep-fried options. Include lean proteins like fish, chicken, and low-fat cottage cheese in their meals and snacks.
- **Exercise more:** Doing regular physical activity can help maintain a moderate weight.
- **Improve insulin sensitivity:** Other lifestyle strategies that can help improve insulin sensitivity include managing stress, getting enough sleep, and tracking blood sugar to make informed changes to their diet and lifestyle.

3.5 General approach to the management of diabetes

The general approach to the management of diabetes is outlined on page 59.

All patients with **type 1 diabetes** besides lifestyle modifications (SNAPSS) require insulin therapy. Adults can be managed as an outpatient. (Note: children diagnosed with type 1 diabetes should be referred to a specialist paediatric unit for full assessment and the management is discussed in section 9.0 Diabetes in children).

For all patients with **type 2 diabetes**, Non-Pharmacological (SNAPSS) intervention is essential. This approach can produce good glucose control. Drug therapy should only be considered if blood sugar levels remain uncontrolled after 6 weeks of lifestyle modifications. The decision to commence glucose lowering medications is based on the degree of hyperglycaemia and the presence or absence of symptoms.

In general, the use of oral glucose medications should be considered if despite SNAPSS intervention the fasting glucose levels are above 7 mmol/L and/or HbA1c is > 7.0%. The table below shows the targets to be achieved that ensures good diabetic control.

Table 14. Targets to ensure good diabetic control

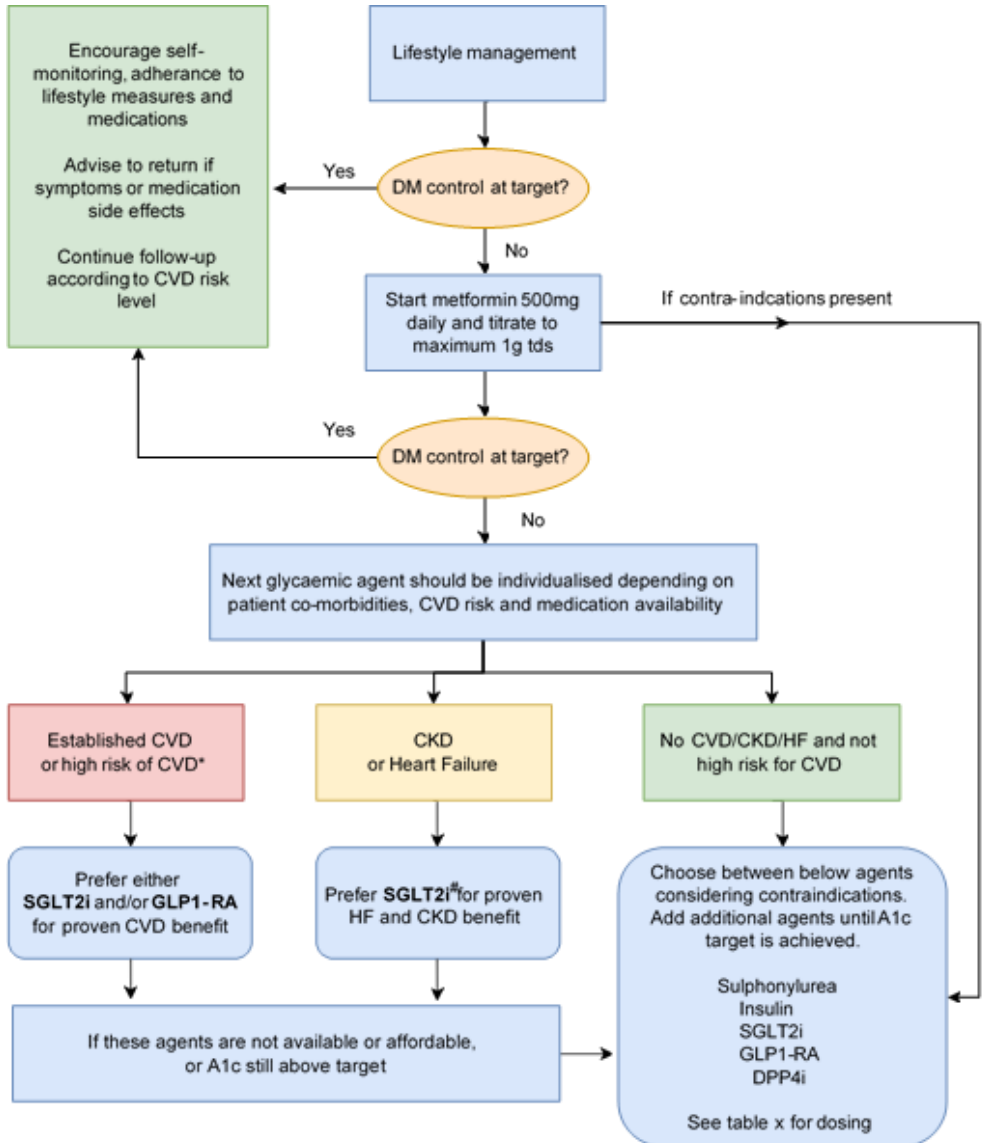
		Aim for:
Blood glucose control targets for persons with Type 2 diabetes	Fasting blood glucose	4–7 mmol/l
	Random blood glucose	5–10mmol/l
	HbA1c	<7%

NOTE: As discussed above the glycaemic target for older patients with cardiovascular disease and multiple vascular risk factors warrants levels higher than that mentioned above (FBS 5-7. RBS 6–10 mmol/and HbA1c 8%).

Metformin is now generally considered to be first line treatment unless contraindicated. A sulphonylurea group of agents like glipizide is added later if the blood sugar levels are still not adequately controlled. Treatment with other oral glucose lowering medications (glitazones, alpha glucosidase inhibitors, DPP4 inhibitors, SGLT2 inhibitors) and/or insulin needs to be determined on an individual basis.

Glucose control progressively deteriorates over time requiring an increase in drug therapy to maintain glycaemic control. About 50% of patients will require insulin therapy in addition to oral medications within 5 to 10 years of diagnosis of type 2 diabetes (secondary failure). In these patients combining oral glucose lowering medications with insulin minimises the amount of insulin required.

Figure 12. Treatment flow chart



*High-risk CVD = >55yo with 2 or more risk factors (including obesity, hypertension, smoking, dyslipidaemia)

#Current literature recommends not to start SGLT2i if eGFR<20 but this cut off is expected to be lowered as further evidence becomes available.

3.6 Special situations in the management of diabetes

3.6.1 Physical activity

- Physical activity carries additional risks in diabetic patients on insulin therapy. Hypoglycaemia is a major concern in this situation.
- For mild to moderate physical activity (e.g. fast walking on a flat surface, mopping the floor) for 30 minutes, extra carbohydrates should be taken beforehand.
- For short bursts or longer strenuous physical activity (e.g. running, playing rugby, soccer etc, scrubbing the floor, moving heavy furniture), it is advisable to reduce dosage of short-acting insulin. It is advisable to eat some carbohydrates before and defer their insulin after physical activity.

3.6.2 Fasting

Many patients with diabetes fast for religious or other reasons. Management of Diabetes in fasting depends upon the duration of fasting, way of fasting.

Medical benefits of fasting:

- Decreases body weight
- Increases high density lipoprotein (HDL) without any change of triglyceride and total cholesterol
- Improvement of glycaemic control
- Improvement of immunity

Diet plan during fasting: Diabetes patients who want to fast, need to eat properly before starting the fasting period. Diet should consist of a balanced meal with carbohydrates, fruits and vegetables. Break the fasting at the proper time without delay. Eat a balanced diet.

Exercise: Avoid vigorous exercise during fasting. This is because of the risk of hypoglycaemia. Timing of exercise: 1–2 hours after breaking the fast.

Diabetic patients who are not fit to fast (who cannot fast) include the following:

1. Patients on dialysis
2. Acute illness, onset of cardiovascular diseases, recent history of myocardial infarction, hepatic dysfunction
3. Diabetes patients with the history of severe hypoglycaemia or recurrent hypoglycaemia, diabetic coma
4. Diabetes patient with the history of DKA and HHS within last 3 months
5. Diabetes patient with sustained and poor glycaemic control
6. GDM patient with poor glycaemic control.

Drugs modification during fasting: Diabetes patients who are not eating in between fasting need their dosage adjusted. There is no need for drug dosage modification for diabetes patients who are eating in between the fasting.

- **Tab metformin** – low risk of hypoglycaemia. Patients taking 500 mg or 1gm BD dose, should take it before starting the fast and after breaking the fast. Those who are taking 500 mg TDS dose, will take 1

tab (500 mg) before starting fasting and 2 tabs (1 gm) after breaking the fast.

- **Sulphonylurea Tab Glipizide** – high risk of hypoglycaemia. 50% of dose reduction before starting fasting. Usual dose during breaking fasting. Those who are taking a single dose will divide the dose in the morning and evening.
- **DPP4 inhibitors Sitagliptin and Linagliptin** – no need for dose modifications.
- **SGLT2 inhibitors e.g. Empaglifazon and Depaglifazon** – cease usage during fasting as side effect of ketoacidosis
- **Insulin** – 50% dose reduction in morning during starting fasting. Usual dose during breaking fasting. For type 1 diabetic patients, their usual daily insulin dose can be divided into two doses given before each of the two main meals of the day.

When to break fasting: If CBG < 3.9 at any time of the day during fasting or patient develops hypoglycaemic symptoms irrespective of CBG they need to break fasting. If CBG > 16.7 mmol/l, check urine ketone.

***Note:** For type 2 diabetic patients, the timing of the dose of the oral hypoglycaemic agent is important.

3.6.3 Illness

Metabolic control may deteriorate rapidly during illness of any kind. As part of their education programme all patients should have a contingency plan on which they can work on if an illness upsets their diabetes control. There should be close monitoring of blood sugar levels.

Insulin doses should be adjusted according to blood sugar levels and changed to short-acting insulin for better control. Insulin must not be stopped. If there is a need to reduce the dose, it should not be more than 30%. Oral hypoglycaemic drugs should not be stopped unless the patient cannot eat.

Maintenance of fluid intake is important. If the patient is unable to take in solid food, substitute with fruit juices, regular soft drinks, or other fluids containing glucose. Patients who have repeated vomiting should contact medical help early as both intake of fluids and carbohydrates need to be maintained.

The patient should have thorough knowledge of when, how and where to contact a specialist health care facility.

3.6.4 Travelling

Patients on insulin can travel overseas as long as there is proper adjustment of their food and insulin doses to adapt to the changing local times.

Journeys should be carefully planned. Enough insulin for the whole trip with some spares should be carried. Insulin should be kept cool inside a well-insulated bag.

It is advisable to carry a medical report from the doctor with treatment details to facilitate customs clearance. The report will assist in dealing with any

medical problems that may arise during travelling.

Easily absorbed sugary foods (e.g. lollies, fruit juice) should be available while travelling as well as food that takes a little longer (e.g. crackers) to absorb. These can be taken if there is an indication of impending hypoglycaemia.

4.0 Diabetes and cardiovascular risk management

4.1 What is the Fiji Cardiovascular Risk and Management Guidelines (CRAM)?

This is the adaptation of the WHO PEN by the integration of the Cardiovascular Therapeutic Guidelines (3rd edition, 2015) and the *Fiji Diabetes Management Guidelines* (3rd edition, 2012) for use at primary health care facilities, but with strong links to the various levels of the health system.

Why is CVD screening important?

- to identify cardiovascular risk factors and clinical conditions that may influence prognosis and treatment
- to determine the presence of target organ damage (heart, kidneys and retina)
- to identify if client is at high risk and in need of urgent intervention
- to identify if client needs special investigations or referral (e.g. with secondary hypertension)
- to allow for early diagnosis and treatment of people who are at high risk to reduce their cardiovascular risk.

Steps in conducting CVD screening

Step 1: Determine if client has acute presentation of cardiovascular disease such as chest pain or signs of stroke, provide emergency care and refer. If not, proceed to step 2.

Step 2: Determine previous history of cardiovascular diseases

- Heart attack/Angina and heart failure
- Stroke/transient ischaemic attacks
- Kidney impairment
- Peripheral vascular disease – slow healing ulcer, amputation
- Coronary bypass/stent; carotid endarterectomy

It is not necessary to use the risk charts in clients with any of these conditions as they need intensive intervention. Classify clients as having above 30% CVD risk and manage accordingly.

Step 3: If client has NO history of cardiovascular diseases, proceed to assess the client's behavioural risk factors (smoking, alcohol use, physical inactivity/sedentariness and unhealthy diet)

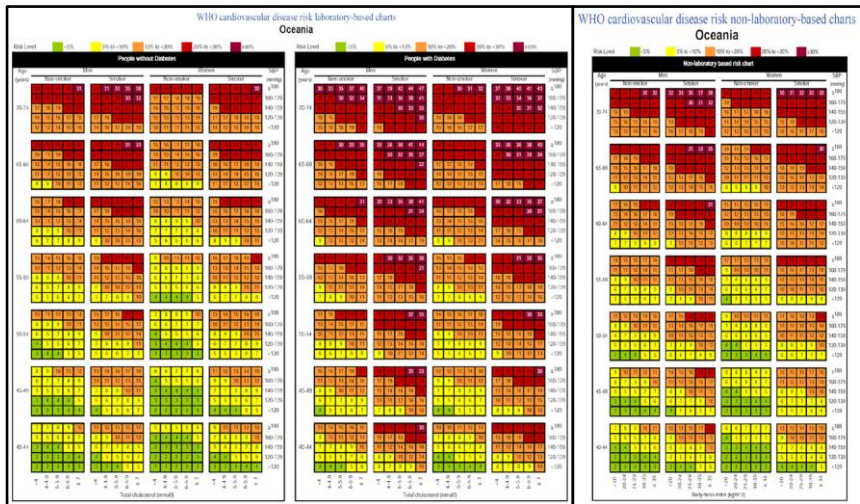
Step 4: Screen for intermediate risk factors (BMI, waist circumference, capillary blood glucose, pulse rate and blood pressure.

Step 5: Perform CVD-focused physical examination

Step 6: Apply referral criteria and refer if needed. If not referred, then estimate CVD risk using the Oceania Chart

Step 7: Counsel and manage according to risk

Figure 13. WHO Oceania CVD Risk chart



The Cardiovascular Disease (CVD) risk score determined by the WHO Oceania CVD risk chart is a measure of the probability of having a fatal or non-fatal cardiovascular event such as a heart attack or stroke in the next 10 years.

Figure 14. WHO cardiovascular risk score colour coding

Cell colour	2019 WHO CVD Oceania charts
Green (Low risk)	<5%
Yellow(Medium risk)	5% to <10%
Orange (High risk)	10% to <20%
Red (Very high risk)	20% to <30%
Dark red (Extremely high risk)	≥30%

Colour coding risk percentage:

Individuals at higher CVD risk require more intensive counselling, drug treatment and follow-up than lower risk individuals. Conversely, it is important to avoid over-treatment in those with a low risk of CVD.

When to use the CVD risk charts for making treatment decisions?

1. In those with known cardiovascular risk factors or at high risk of developing diabetes such as:

- Age ≥ 30 years
- Obesity (BMI ≥ 30) or Central obesity (waist circumference > 102 cm in men or > 88 cm in women)
- Passive or active smoker (or who quit only in the last 12 months)
- Blood pressure $\geq 140/90$ mmHg
- Previous diagnosis of gestational diabetes or pre-diabetes
- Those with family history of risk factor(s):
- Diabetes in first degree relative (parent or sibling)
- Premature coronary heart disease or ischaemic stroke in first degree relative (father or brother < 55 years, mother or sister < 65 years)

2. In those diagnosed with diabetes

When CVD risk charts are NOT necessary for making treatment decisions:

- Very high risk groups such as those with:
- Previous CVD event (Angina, Myocardial Infarction, Percutaneous Coronary Intervention (PCI), Coronary Artery Bypass Grafting (CABG), Transient Ischaemic Attack (TIA), Stroke, Peripheral Vascular Disease (PVD), (signs of PVD include non-healing sores, ulcers, gangrene or infections in the extremities that may necessitate amputation)
- Diabetes with overt nephropathy or other significant renal disease (albumin/creatinine ratio ≥ 30 or persistent albuminuria ≥ 300 mg/24hours)
- Chronic renal failure/impairment (GFR < 45 ml/min for at least 3 months)
- All the above cases are classified as brick red (CVD risk $\geq 30\%$) for life and does not need recalculation of risk
- Without established CVD but with very high levels of single risk factor:
- Total cholesterol ≥ 7.5 mmol/l
- Low density lipoprotein (LDL) cholesterol ≥ 6 mmol/l
- Total cholesterol/high density lipoprotein cholesterol (TC/HDL ratio) > 8.0 mmol/l
- Persistent raised blood pressure $\geq 160/100$ mmHg

Risk stratification is not necessary for making treatment decisions. All of these individuals need intensive lifestyle intervention and appropriate drug therapy

Who to refer to a higher-level health facility?

Table 15. Deciding who to a higher-level health facility

Any individuals with these acute signs and symptoms of cardiovascular disease	Individuals with prior cardiovascular disease who have any of the following	Individuals without prior cardiovascular disease who have any of the following
<ul style="list-style-type: none"> • Chest pain/tightness • Irregular heartbeats or palpitations • Breathlessness • Headache, dizziness, sudden blurry vision • Difficulty talking • Weakness of upper and/or lower limbs • Numbness on one side of the body • Swelling of lower limbs • Swelling of face/puffiness of eyes 	<ul style="list-style-type: none"> • Acute signs and symptoms of cardiovascular disease • New chest pain or worsening symptoms of angina, TIA or stroke • Uncontrolled blood pressure despite treatment with 2 or 3 anti-hypertensive medications • Uncontrolled Diabetes despite on maximal oral anti-diabetic medications • Diabetes with severe infection and or foot ulcer • Diabetes with recent deterioration of vision 	<ul style="list-style-type: none"> • BP> 180mmHg systolic or 110mmHg diastolic (urgent) • BP of > 140mmHg systolic or > 90mmHg diastolic in individuals < 40years to exclude secondary hypertension • Target organ damage • Cardiac murmurs or arrhythmia • Raised BP >140/90mmHg (in DM >130/80mmHg) while on 2 or 3 anti-hypertensive medications • Any proteinuria • Newly diagnosed DM with urine ketones 2+ or in lean individuals < 30 years • Total cholesterol>7.5mmol/l • DM with poor control • DM with severe infection and or foot ulcers • DM with recent deterioration of vision or no eye exam in 2years • Very high cardiovascular risk >20%

Management of total CVD risk: Refer to CRAM guideline, 2nd Edition, 2023. Cardiovascular risk management goals include:

- Quit tobacco use or do not start
- Make healthy food choices
- Be physically active
- Reduce BMI, waist-hip ratio or waist circumference
- Lower blood pressure
- Lower blood cholesterol
- Control blood glucose level

Diabetes-associated conditions

4.2 Hypertension

Hypertension is a major risk factor for both cardiovascular diseases and renal complications. Patients with diabetes should have blood pressure monitored on each visit. Hypertension can be diagnosed if a patient has blood pressure of 140/90 mmHg or more than one occasion preferably on separate days. For individuals with diabetes and hypertension a target blood pressure of $\leq 130/80$ mmHg may be appropriate.

For patients with diabetes and hypertension, blood pressure targets should be individualised through a shared decision-making process that addresses cardiovascular risk, potential adverse effects of anti-hypertensive medications, and patient preferences

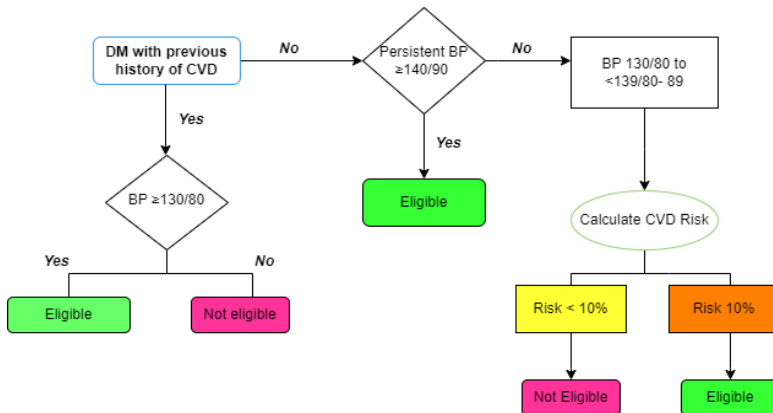
Blood pressure control is more important than the choice of anti-hypertensive drugs. However, angiotensin-converting enzyme inhibitors (ACEIs/ARBs) are the first-line drugs in controlling hypertension. Other anti-hypertensive drugs such as Calcium channel blockers (e.g., amlodipine) and diuretics (e.g. hydrochlorothiazide). In Fiji, beta blocker and methyldopa are available and can be used in appropriate conditions. A combination of the above drugs might be needed to achieve desired blood pressure control. Lifestyle interventions like weight loss, low sodium diet, physical activity and moderation of alcohol is recommended.

For further information refer to hypertension on section of the Fiji Cardiovascular guideline. For further information on diabetes and chronic kidney disease, refer to *Nephropathy* section of this guideline

Does my patient need anti-hypertensive medications?

Below is an algorithm for when to prescribe anti-hypertensive medications:

Figure 15. An algorithm for when to prescribe anti-hypertensive medications



4.3 Hyperlipidaemia and dyslipidaemia

This is a common occurrence in diabetic patients. Elevated triglycerides and LDL (low-density lipoprotein) cholesterol with reduced HDL (high density lipoprotein) cholesterol is a common pattern and may warrant treatment. Getting the best possible control of blood glucose is an important first strategy. If lipid abnormalities persist despite this, they may need to be treated in their own right. The recommended drugs are statins (e.g. simvastatin, atorvastatin, pravastatin, lovastatin). The common side effects of lipid lowering drugs are muscle and liver problems. It is advisable to do liver function tests before starting statins and a month after commencement of statins.

Table 16. Indications for starting treatment

Indications for starting treatment	
Type 2 diabetes and age > 40 years regardless of baseline cholesterol	
Under 40 years with diabetes, and cholesterol > 7.5 mmol/L	
Absolute cardiovascular disease risk >30%	
Established cardiovascular disease	

Once patients' statins are maximised but lipids are not controlled, refer to a specialist for use of alternative lipid lowering agents.

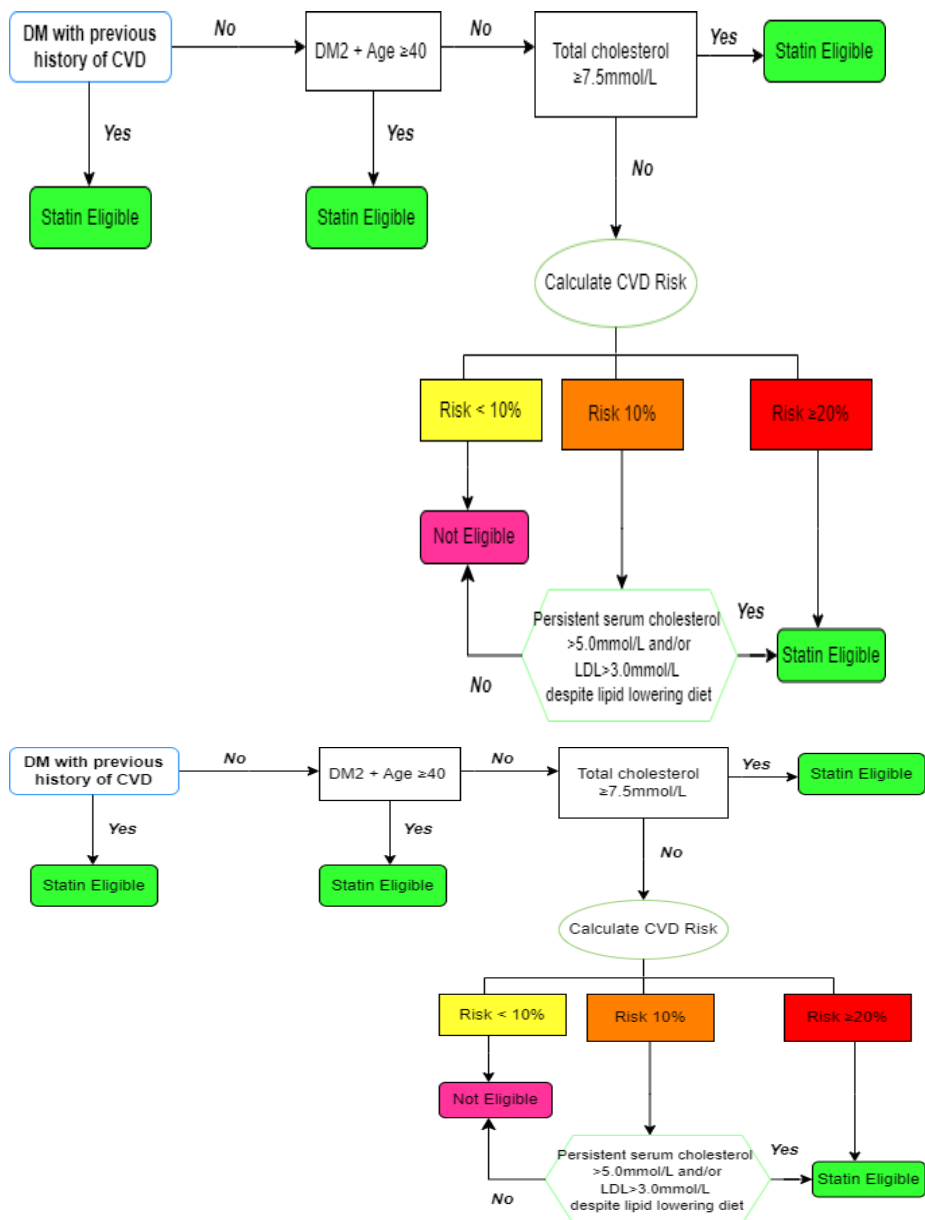
Lipid targets

Table 17. Lipid targets

Total cholesterol	<4.0 mmol/L
HDL cholesterol	>1.0 mmol/L
LDL cholesterol	<2.0 mmol/L
Triglycerides	<1.5 mmol/L

Does my patient need statins?

Figure 16. Algorithm for determining if a patient needs statins



4.4 Antiplatelet therapy

Antiplatelet therapy includes Aspirin, Clopidogrel and Ticagrelor, Prasugrel.

Unless contraindicated*Aspirin is recommended for all adults with diabetes and a history of cardiovascular diseases (CVD). In the absence of CVD, it is “reasonable” to consider Aspirin in those patients who have a cardiovascular risk score of $> 30\%$ or are at an increased risk, based on at least one additional CVD risk factor such as smoking, dyslipidaemia, hypertension, family history of cardiovascular disease and albuminuria. In case of Aspirin allergy, consider alternative options such as Clopidogrel.

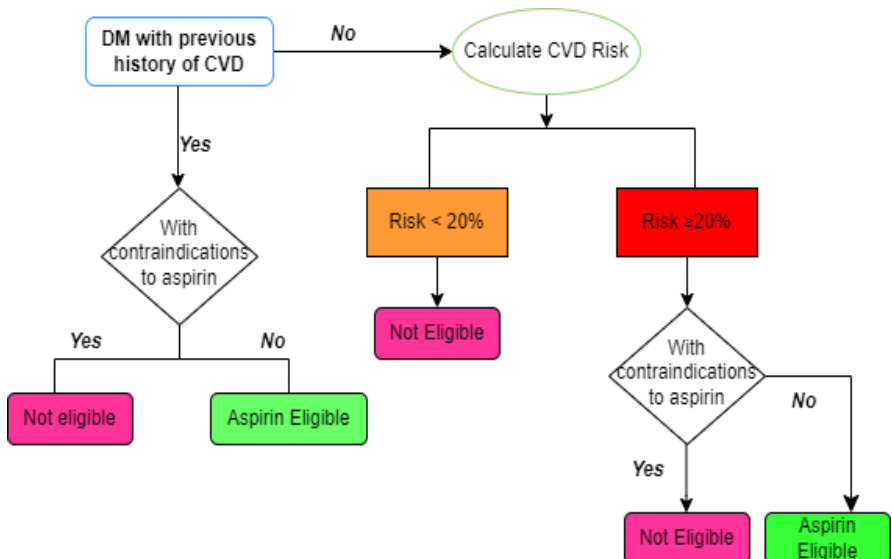
Aspirin contraindications:

- Active peptic ulcer disease
- Aspirin allergy/ intolerance
- Bleeding disorder (e.g. Haemophilia)
- Thrombocytopenia
- Severe liver disease
- History of recent intracranial bleed

A specialist should be consulted if a patient needs antiplatelet medication but also has any of the above contraindications

Does my patient need Aspirin?

Figure 17. Algorithm for determining if a patient needs Aspirin?



Summary

Table 18. Summary of risk management

	Diagnosis	
	Diabetes CVD risk > 20%	Diabetes CVD risk < 20% (Green, Yellow, Orange)
Blood pressure	<130/80 mmHg	<130/80 mmHg
HbA1c test	Done at least once in the past 12 months	Done at least once in the past 12 months
Kidney disease assessment	Recommended to be yearly with eGFR and proteinuria dipstick	Recommended to be yearly with eGFR and proteinuria dipstick
Eye examination	At least once in the past year and then depending on ophthalmologist recommendation	At least once in the past year or depending on ophthalmologist recommendation
Foot assessment	At least once in the past 12 months	At least once in the last 12 months
Eligible for anti-hypertensive medications	Yes, if prior or latest BP is > 130/80 mmHg or diagnosed with hypertension	Yes, if prior or latest BP is > 130/80 mmHg or diagnosed with hypertension
Eligible for statins	Yes, regardless of total cholesterol level	Yes, if ≥40 years or total cholesterol ≥7.5 mmol/l or persistent high serum cholesterol 5.0 mmol/L and/or LDL cholesterol 3.0 mmol/L, despite lipid lowering diet
Eligible for low-dose aspirin	Yes	Yes, for Orange if no contraindications. No, for Green and Yellow

5.0 Management of acute complications of diabetes

5.1 Hypoglycaemia

Hypoglycaemia in patients with diabetes is defined as all episodes of an abnormally low plasma glucose level (with or without symptoms) that exposes the person to harm (American Diabetes Association Working Group).

Diabetic patients are more prone to hypoglycaemia symptoms, mainly due to the use of oral hypoglycaemic agents, insulin and the risk of sepsis. However, the threshold varies from person to person. Hypoglycaemia can be grouped as:

- Hypoglycaemia with symptoms regardless of blood glucose level
- Hypoglycaemia without symptoms with glucose level below 4.0 mmol/l

Hypoglycaemia signs and symptoms are as follows:

Table 19. Signs and symptoms of hypoglycaemia

Signs	Symptoms
<ul style="list-style-type: none">• sweating• trembling• difficulty in speaking• confusion• ataxia• stupor• pallor• seizures• coma	<ul style="list-style-type: none">• headache• hunger• irritability, anxiety• paraesthesia• palpitations

Patients suffering from pre-existing autonomic neuropathy may not have any warning symptoms that manifest with neurological symptoms straightway.

The factors that precipitate hypoglycaemia include:

- high insulin dose
- high doses of sulfonylureas
- presence of renal failure
- liver failure
- septicaemia
- missed or delayed meals
- hormonal disturbances
- vigorous physical activity
- hypoglycaemia unawareness.

All patients with hypoglycaemia should be treated urgently.

Treatment

Conscious and able to swallow

If the patient is conscious and able to swallow, give a sugary food (jelly bean, honey, glucose, soft drinks) or drink followed by foods that take longer to be absorbed e.g. crackers. Repeat blood glucose level every 15 minutes and treatment until symptoms resolve (for symptomatic) or blood glucose level is above 4.0 mmol/L (for asymptomatic). Once symptoms have resolved and blood glucose returns to normal, advise patients to take an appropriate meal with complex carbohydrates to prevent recurrence of hypoglycaemia.

Unconscious and unable to swallow – away from the health facility:

If the patient is unable to swallow or becomes unconscious at home, give sugar paste or honey around the buccal mucosa and transfer immediately to the nearest health care facility for intravenous glucose therapy.

Unconscious and unable to swallow – at a health facility:

Give 20 ml to 50 ml of 50% dextrose intravenously over 1–3 minutes in a large vein followed by continuous intravenous infusion of 5% dextrose for up to 24 hours.

If IV access is not available but Glucagon is, then administer 1 mg SC / IMI. Unconscious patients usually start to respond within 6 minutes. Failure to respond may indicate reduced hepatic reserves. Consider administering a second dose of 1 mg Glucagon 20 minutes after the first.

After a hypoglycaemic episode, monitor blood glucose every 1–2 hours for the first 4 hours. Monitoring may need to be extended if the cause of hypoglycaemia is not immediately reversible.

Hypoglycaemia in the elderly, particularly as a consequence of accumulation of sulphonyl urea in the plasma, may be difficult to reverse and may reoccur for several days after stopping the drug.

It is important to educate all diabetic patients on the symptoms of hypoglycaemia, the factors that may precipitate it, the preventive measures and the treatment that can be undertaken in cases of mild attacks. In severe cases it is important to advise relatives to seek immediate help from the nearest health facility to avoid any irreversible brain damage.

Enquire about frequency of hypoglycaemia episodes during clinic visits and adjust oral hypoglycaemic accordingly.

5.2 Diabetic ketoacidosis (DKA)

5.2.1 General considerations

Diabetic ketoacidosis (DKA) is characterised by the triad of ketosis, hyperglycaemia and acidaemia. The presence of ketone bodies is a consistent finding in DKA. DKA occurs predominantly in type 1 diabetic patients but can occur in type 2 diabetes. It might be the first presentation in an unknown type 1 diabetes person.

The diagnostic features of DKA include:

Table 20. Diagnostic features of diabetic ketoacidosis

Clinical features
Vomiting
Abdominal pain
Kussmaul's breathing
Ketotic breath
Dehydration
Mental confusion progressing to coma
Biochemical features
Hyperglycaemia (example CBG >11.1 mmol/L)
Acidosis (arterial pH ≤ 7.30) and/or bicarbonates ≤ 15 mmol/L
Urine ketones (Plasma ketones if available)

It is necessary to test urine for moderate to large ketone bodies. Venous rather than arterial blood pH and bicarbonate are now preferred.

The common precipitating factors of DKA include:

- Precipitating factors
- History of insulin omission
- Inadequate insulin therapy
- Drugs e.g. corticosteroids
- Infections e.g. UTI, pneumonia
- Acute coronary syndrome
- Recent trauma
- Pregnancy
- Pancreatitis

Initial evaluation:

1.) Assess the following:

- Airway, breathing and circulation (ABC)

- Mental status
- Possible precipitating events (e.g. infection, myocardial infarction, stroke, trauma or drug non-compliance)
- Volume status

2.) Baseline investigations:

- Serum glucose
- Urea, electrolytes and creatinine
- Arterial blood gas and calculation of anion gap: $(\text{Na} + \text{K}) - (\text{Cl} + \text{HCO}_3)$
- Full blood count with differentials
- Urine dipstick ketones (*measurement of serum ketones is not available)
- Electrocardiogram

**Additional testing (cultures of urine, sputum and blood, serum amylase, and chest x-ray) should be performed on a case-by case basis.*

5.2.2 Management

Management should be undertaken urgently in the nearest health care facility. The most important therapeutic intervention in DKA is an appropriate fluid replacement. Insulin therapy can be started subsequently. Discuss with the medical team at the divisional hospitals. Ensure that the patient has 2 intravenous accesses.

Transfer patient to an appropriate health facility with specialist care.

A. Fluids:

Administer intravenous infusion of normal saline as follows:

First litre for 30 minutes
Second litre for one hour
Third litre for 2 hours

Infusion should be administered according to clinical assessment of the patient. Once the blood sugar level reaches 14 mmol/l, change intravenous fluid to 5% dextrose (**Note 10% dextrose fluid preferred**). If 5% dextrose is not available, use dextrose saline.

It is important to continue normal saline to correct circulatory volume along with dextrose infusion if necessary. Caution is required in the following conditions:

Exercise caution with fluid replacement in:

- Elderly
- Pregnant
- Young people aged 18–25 years
- Heart or kidney failure

- Other serious comorbidities

B. Insulin

A fixed rate IV insulin infusion 0.1 units per kilogram body weight (estimated if necessary) is recommended for initial few hours of therapy. Example: 5 to 10 units of insulin per hour.

Calculation of the insulin dose for weight

Table 21. Insulin dosage calculation for weight

Weight in kg	Insulin dose per hour (units) at 0.1 units/kg/h if glucose ≥ 14 mmol/L
40–49	4
50–59	5
60–69	6
70–79	7
80–89	8
90–99	9
100–109	10
110–119	11
120–129	12
130–139	13
140–149	14
>150	15 (any dose higher than this should be on the advice of the consultant)

If IV access is not available, give short acting insulin (soluble insulin) IMI at 8 units/hour. Do not give subcutaneously, as in shock state the absorption is poor.

Test

- Blood sugar 2-hourly
- Urine ketones every 4 hours
- Venous bicarbonate every 4 hours

- Serum potassium and sodium every 4 hours.

The fixed rate of insulin may need to be adjusted if:

- The ketone concentration is not falling fast enough
- The venous bicarbonate level is not rising by 3 mmol/L per hour
- The capillary blood glucose level does not decrease by 3 mmol/L per hour

If glucose does not fall by 3–4 mmol in the first hour, then double the dose of insulin infusion.

Insulin doses can be halved when blood glucose level reaches 14 mmol/L. Thereafter, insulin can be changed to multiple-dose insulin regimen subcutaneously followed by twice-daily dosing.

Be cautious with insulin infusion if severe hypokalaemia is suspected.

C. Electrolytes and acid base disturbance

i. Potassium: Insulin takes glucose and potassium into the cells and their serum concentrations fall.

Table 22. Potassium levels and supplements

Potassium level	Supplement
>5.5 mmol/L	None
3.5–5.5 mmol/L	Initiate intravenous potassium at a rate of no more than 10–20 mmol/hour (added to IV infusion fluid bag) once insulin and fluids have been started and renal function and urinary output have been assessed as satisfactory. Example: 40 mmol/1L IVF (maximum rate of 20 mmol/hr)
<3.5 mmol/L	20 mmol over 1 hour and add 40 mmol per 1 litre of IV fluid (maximum rate of 20 mmol/hr). Review potassium requirements. A separate potassium infusion line should be started.

*Cease insulin infusion if potassium is less than <3.5 mmol/L, correct potassium before restarting.

Potassium infusion should not exceed 20mmol per hour.

ii. Bicarbonate: Measure venous rather than arterial bicarbonate and pH. Sodium bicarbonate should not be given routinely. It is only given when the blood pH is less than 7.0. In such cases, infuse 50 mmol of sodium bicarbonate over one hour. Example: mix 50 mmol of Bicarbonate with 100 ml of normal saline and transfuse over an hour. Sodium bicarbonate should be given as an infusion with strict attention to potassium concentration, which may fall precipitately. Repeat doses of bicarbonate may be required if pH continues to remain below 7.

D. Treatment of underlying cause

Treat the underlying cause, especially infections.

E. Monitoring guide:

Table 23. Monitoring parameters, frequencies and targets

Monitoring parameter	Frequency	Target
CBG	2 hourly	drop >3 mmol/L per hr
Venous pH	4 hourly	bicarbonate rise of 3 mmol/l/hr; anion gap <12
Serum potassium	4 hourly	>3.5 mmol/L
Urine output	1 hourly	>1ml/kg/hr
Urine ketones	4 hourly	Declining

Switching to subcutaneous insulin: This is a clinical decision but some of the factors that can help in decision-making are:

- Serum glucose < 14 mmol/L
- Anion gap < 12
- Serum bicarbonate > 18 mmol/L
- Venous pH >7.3
- Patient is mentally alert and able to tolerate feeds.

IV insulin should be continued until the first dose of subcutaneous insulin has been administered.

F. Patient education

Re-educate about avoidance of the complication and the recognition of early warning signs and symptoms.

5.3 Hyperosmolar, hyperglycaemic state

Hyperosmolar hyperglycaemia primarily occurs in people with type 2 diabetes and is characterised by marked hyperglycaemia and dehydration without ketoacidosis.

A patient will present with a history of thirst, polyuria and progressive impairment of consciousness. It differs from DKA in that patients with hyperosmolar, hyperglycaemic state do not develop ketoacidosis.

Investigations reveal very high blood glucose, usually higher than 30 mmol/L, the serum sodium is often elevated and the calculated serum osmolality >320 mOsm/l.

Management

The treatment is similar to that in DKA (see above).

Intravenous isotonic saline, low-dose intravenous insulin (4–6 u/hour by infusion) and careful attention to serum potassium concentrations are the central strategies. Careful monitoring is required as in DKA.

On recovery, the patient may not need long-term insulin therapy. After an initial period of stabilisation with insulin, most patients with type 2 diabetes who present in a hyperosmolar, hyperglycaemic state can be controlled with oral hypoglycaemic drugs combined with diet.

6.0 Management of late complications of diabetes

Diabetes mellitus is associated with a variety of late complications that are either vascular or non-vascular. The vascular complications are broadly classified as microvascular or macrovascular. The microvascular complications are retinopathy, nephropathy and neuropathy and macrovascular coronary heart disease, cerebrovascular disease and peripheral vascular disease.

(For community education purposes, the acronym 'SNAKE' is used to identify the late complications in the skin, nerves, arteries, kidneys and eyes).

Table 24. Major risk factors for the development of complications

Major risk factors for the development of complications include:	
Younger age at onset	Family history of complications
Longer duration of diabetes	Hypertension
Poor glycaemic control	Smoking
Dyslipidaemia	

6.1 Retinopathy

ALL PERSONS WITH DIABETES MELLITUS NEED REGULAR EYE CHECKS FOR EARLY DETECTION OF DIABETIC RETINOPATHY TO PREVENT BLINDNESS.

Diabetic retinopathy is a major cause of visual impairment and blindness in Fiji. Good management of diabetes and early treatment can prevent visual impairment and blindness in majority of patients.

Diabetes damages the small blood vessels in the retina causing them to leak or occlude. Diabetes damage has a typical clinical picture and progression in the damage of the retinal blood vessel is reflected by the progression of the clinical picture. When particular features are seen, the chances of vision loss increases; when others develop, vision loss is inevitable. Recognising these patterns can be used to grade the retinopathy.

Diabetic retinopathy often has no early warning signs. Vision may remain unaffected until the disease becomes severe. Diabetic retinopathy can progress rapidly without much warning. Therefore, it is important that regular eye examinations are carried out to monitor progression of the disease, to identify and treat vision threatening diabetic retinopathy.

Treatments, particularly with laser and intravitreal anti-VEGF [Ma1] are available, if applied appropriately and in a timely manner, reduces the risk of vision loss.

6.1.1 Risk of retinopathy

All people diagnosed with diabetes are at risk of developing retinopathy. The risk factors for developing diabetic retinopathy and progression are:

- duration of a person's diabetes

- poor metabolic control with elevated blood glucose
- hypertension
- elevated blood lipids
- pregnancy
- nephropathy.

6.1.2 Diabetic retinopathy grading

The grading follows the Pacific Island Diabetic Retinopathy Guidelines.

Table 25. Diabetic retinopathy guidelines

DIABETIC RETINOPATHY GRADING IN FIJI		<p>The presence and severity of retinopathy are used to determine the grade of retinopathy.</p> <ul style="list-style-type: none"> • Each eye is graded separately. • For each eye, the macula and peripheral retina are graded separately. • An individual with diabetes is assigned a single grade for each of the macula and the peripheral retina. These equate to the grade of the worst of the two maculae and the worst of the two peripheral retinæ. 	
Peripheral retina		Macula	
The peripheral retina is that retina beyond 2 disc diameters from the foveola		The macula is that retina within 2 disc diameters of the foveola.	
Description	Grade	Description	Grade
No retinopathy	R0	No Macular Disease	M0
Minimal	R1	Minimal	M1
Mild	R2	Mild	M2
Moderate	R3	Moderate	M3
Severe	R4	Severe	M4
Proliferative	R5	Stable, treated Macular Disease	MT
Advance	R6	Reference: Diabetes Retinal Screening, Grading and Management Guidelines for Use in Pacific Island Nations 2019	
Stable Treated Diabetic Retinopathy	RT		

6.1.3 Screening

There are trained screeners at Divisional Hospital Eye Clinics and on outreach. They take fundus photographs, grade retinopathy and only refer to ophthalmologists cases that need further assessment. The grading is done according to the Pacific Island Diabetic Retinopathy Guidelines as outlined in 6.1.2.

The recommended screening tool in order of preference is a fundus or retinal camera, followed by an indirect ophthalmoscope and lastly a direct ophthalmoscope. For the latter two, the pupils must be dilated.

- A. **People with type 1 diabetes:** Initiate screening 5 years after diagnosis of diabetes is made, or at puberty (>11 year old), whichever is the earlier.
- B. **People with type 2 diabetes:** Initial screening is done once diagnosed. Ongoing screening is done at least every year if no DR is detected.
- C. **Pregnant women who are already diabetic and become pregnant:** Screening is done early in the first trimester of the pregnancy, regardless of previous history of screening. If there's no retinopathy and no clinical modifiers present, annual screening can continue as usual. If minimal retinopathy is present, frequent screening throughout the pregnancy is indicated, and has to be seen by an ophthalmologist. Given that diabetes mellitus is highly prevalent in Fiji, pregnant women with raised blood sugar should be screened as well at booking.
- D. **Follow up:** Ongoing screening is carried out between 1 to 2 years if no DR is detected. Refer to ophthalmologist once any DR is detected. The frequency of the assessments is increased depending on the severity of the retinopathy and the risk factors for progression to vision threatening disease.

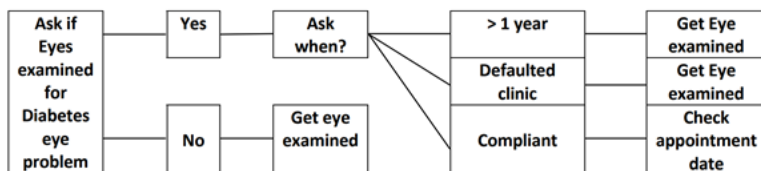
6.1.4 Eye assessment

- a. Check visual acuity with Visual Acuity (Snellen's) chart as unaided or aided (with present glasses). Check with pinhole if visual acuity is 6/12 or worse
- b. Check pupil reaction in both eyes (direct and consensual)
- c. Check depth of anterior chamber with light directed from the lateral limbus
- d. Check red reflex with ophthalmoscope; if present, do fundus photography.

If a Fundus Camera is not available or there is poor red reflex, do the following:

- a. Dilate pupils with tropicamide eyedrop. Add phenylephrine eyedrop if available.
- b. Check for cataract or vitreous bleed/opacity
- c. Assess retina using an indirect ophthalmoscope or a direct ophthalmoscope.

Each person with diabetes mellitus should be asked by the health care worker the following:



6.1.5 Management of diabetic retinopathy

Laser treatment is available in all divisions in Fiji. This treatment can slow down the progression of DR and can stabilise vision. Cases requiring laser treatment are to be referred to the Eye Clinic in the three divisional hospitals if this service is not available in your nearest sub-divisional hospital on outreach.

6.2 Diabetic kidney disease

Approximately half of all patients with T2DM and one-third with T1DM will develop chronic kidney disease (CKD). Diabetes is the leading cause of kidney failure in Fiji and of the long-term complications of diabetes, CKD imposes the highest burden both in medical costs and quality of life.

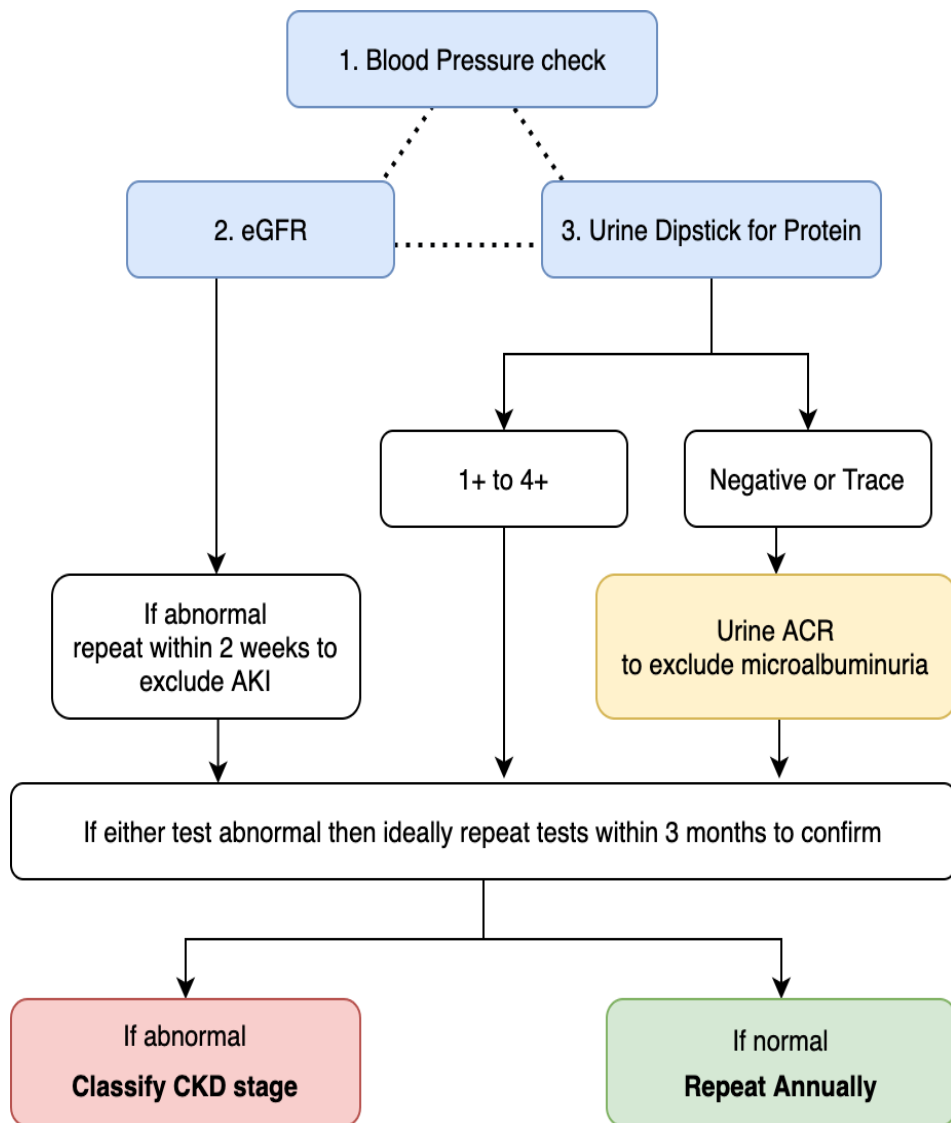
Detailed recommendations for the management of CKD can be found in the “CKD Management in Fiji Primary Care guidelines”.

6.2.1 Screening

Screening for CKD is recommended for all patients with diabetes, as patients can remain asymptomatic until >90% of kidney function has been lost. Screening patients with diabetes has been found to be cost-effective as it enables clinicians to initiate effective treatment in mild disease, thereby delaying or avoiding progression to kidney failure.

Screening should be completed at the first appointment, repeated at least annually thereafter and include the **kidney health triad** of blood pressure measurement, eGFR and proteinuria assessment in Figure 18.

Figure 18. A pragmatic approach to CKD screening in Fiji. ACR, albumin-to-creatinine ratio; eGFR, estimated glomerular filtration rate as calculated from serum creatinine using CKD-EPI or MDRD equations



6.2.2 Classification

Once diagnosed, the clinician should then classify the stage of CKD using both eGFR and albuminuria assessment (Figure 18, above). Assigning a CKD stage provides important prognostic information as the risk of outcomes such as cardiovascular death, kidney disease progression and kidney failure increase with each stage. Notably, the presence of albuminuria independently worsens prognosis significantly.

Figure 19. Classification and predicting prognosis of CKD

CKD is classified based on: • Cause (C) • GFR (G) • Albuminuria (A)				Albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				Urine ACR <3 mg/mmol	Urine ACR 3-30 mg/mmol	Urine ACR >30 mg/mmol Dipstick ≥1+
GFR categories (ml/min/1.73 m ²) Description and range	G1	Normal or high	≥90	Screen 1	Treat 1	Treat 3
	G2	Mildly decreased	60–89	Screen 1	Treat 1	Treat 3
	G3a	Mildly to moderately decreased	45–59	Treat 1	Treat 2	Treat 3
	G3b	Moderately to severely decreased	30–44	Treat 2	Treat 3	Treat 3
	G4	Severely decreased	15–29	Treat* 3	Treat* 3	Treat 4+
	G5	Kidney failure	<15	Treat 4+	Treat 4+	Treat 4+

Low risk (if no other markers of kidney disease, no CKD)

Moderately increased risk

High risk

Very high risk

– Adapted from KDIGO 2024 Clinical practice guideline for management of CKD. Colours reflects the risk of progression and cardiovascular death. The numbers in the coloured boxes is a guide to frequency of monitoring (number of times a year)

6.2.3 Consider alternative causes

Kidney disease from causes other than diabetes does occur in patients with a diagnosis of diabetes. The clinician should therefore consider this possibility for all patients, especially when the patient's duration of diabetic history, glycaemic control and other microvascular complications do not correspond with the severity of CKD found.

In such instances, in addition to a good history and examination, it is recommended the following steps be taken:

1. Ultrasound of kidneys and urinary tract
2. Urine assessment for proteinuria, haematuria and casts
3. Consider referral for specialist review

6.2.4 Management

Figure 20 Summary of key management steps

Summary of key management steps

1. Aim systolic BP < 130 mmHg
2. Use maximum tolerated dose of ACEi/ARB for proven kidney benefits
3. Use SGLT-2 inhibitors for proven kidney benefits
4. Individualise glycaemic target between HbA1c <6.5 to 8.0%
5. Statin therapy for all adults with CKD
6. Discuss dietary advice and regularly encourage lifestyle change
7. Refer to specialist if eGFR < 30 ml/min/1.73m², rapidly worsening function or the cause of CKD is unclear.

Target systolic BP <130 mmHg

Hypertension increases the risk of worsening kidney function and cardiovascular death in patients with CKD. Long-term achievement of target blood pressure has been shown to significantly reduce cardiovascular events, risk of kidney failure and all-cause mortality.

To achieve this target patients often initially require frequent follow-up for proactive up-titration of drug therapy and reinforcement of lifestyle change. An important step is restriction of salt intake to <5g/day (or sodium <2g/day). Lowering salt intake can both lower BP substantially and enhance the response to anti-hypertensive medications, particularly ACEi/ARB.

ACE inhibitor or ARB use

All patients with CKD and albuminuria should be treated with an ACE inhibitor (e.g. enalapril) or ARB (e.g. losartan) as they have been shown to improve kidney outcomes independent of their blood pressure lowering effects. The combination of both ACEi and ARB use simultaneously is **not** recommended.

These medications should be increased every 2-4 weeks to achieve the maximum tolerated dose (enalapril 20mg bd or losartan 100mg daily), ideally while monitoring

creatinine and potassium. They should only be reduced or stopped if one of the following develops:

- Symptomatic hypotension
- Treatment resistant hyperkalaemia
- Persistent rise of creatinine by >30% after excluding other causes of AKI
- In stage 5 CKD to reduce uremic symptoms / hyperkalaemia.

Glycaemic control

Glycaemic targets in patients with CKD should be individualised to target HbA1c <6.5% to <8.0%, taking into account a number of factors outlined in Figure 21. For example, a higher target of <8.0% is often preferred in patients with advanced CKD (eGFR <30 ml/min/m²), multiple comorbidities, short life expectancy and with risk factors for hypoglycaemia.

Figure 21. Factors guiding decisions on individual HbA1c targets – adapted from KDIGO 2022 Clinical practice guideline for management of diabetes management in CKD

<6.5%	HbA1c target	<8.0%
CKD stage 1	Severity of CKD	CKD stage 5
Long	Life expectancy	Short
Absent/minor	Macrovascular complications	Present/severe
Few	Comorbidities	Many
Present	Hypoglycaemia awareness	Impaired
Available	Resources for hypo management	Scarce
Low	Propensity of treatment to cause hypoglycaemia	High

Glycaemic drug choice

For most patients with CKD the recommended first line glycaemic medications are **metformin** and **SGLT2 inhibitors**. If glycaemic targets are not achieved with these agents then GLP1 receptor agonists would be next preferred before other agents such as glipizide and/or insulin can be used instead, taking note they have an increased risk of hypoglycaemia compared to the first line options, and it is therefore advisable to start with lowest possible dose and titrate gradually.

SGLT2 inhibitors (e.g. empagliflozin 10mg daily) are strongly recommended for all patients with diabetes and CKD. This class of medication has been shown to significantly improve both kidney and cardiovascular outcomes independent of their effect on glycaemic control. More details can be found in the CKD Management in Fiji Primary Care guidelines.

Metformin is safe and effective in CKD with potential additional cardiovascular benefits beyond its effects on glycaemic control. It is not nephrotoxic per se but should be discontinued if eGFR < 30ml/min/1.73m² or during a dehydrating illness because of a very small risk of lactic acidosis.

Cardiovascular disease risk reduction

Lifestyle advice including smoking cessation, healthy diet and regular physical activity are important management steps in patients with CKD. Statins are recommended for all patients with CKD to improve cardiovascular outcomes.

Patients with diabetes and CKD should consume an individualised diet high in vegetables, fruits, wholegrains, legumes, plant-based proteins, unsaturated fats and nuts. Meats, refined carbohydrates and sweetened beverages should be limited or avoided. Observational studies have reported that high consumption of red and processed meat in particular is associated with increased risk of CKD progression. More details can be found in the CKD Management in Fiji Primary Care guidelines.

6.2.5 Referral for specialist review

Indications for referral for specialist (nephrologist or internal medicine physician) review include:

1. CKD stage 4 or 5 (i.e. eGFR < 30ml/min/1.73m²)
2. Worsening kidney function despite optimal management as described above
3. If the cause of CKD is unclear
 - a. Severity of CKD is significantly greater than would be expected from the history of diabetes and/or hypertension
 - b. Nephrotic syndrome
 - c. Persistent haematuria
 - d. Presence of another relevant condition (e.g., polycystic kidneys, SLE)
4. The presence of complications attributable to CKD.

6.3 Neuropathy

Neuropathy is a chronic complication of diabetes, and several different types of neuropathies can develop in diabetic patients. The commonly seen types are peripheral sensory–motor and autonomic neuropathy. Consider other causes for neuropathy before attributing the symptoms to diabetes. Many patients with diabetic neuropathy do not experience symptoms. Hence, it is important to routinely assess patients for signs and symptoms of neuropathy.

6.3.1 Peripheral sensory-motor neuropathy

Symptoms of peripheral sensory–motor neuropathy include:

- numbness,
- paraesthesia,
- pain, and
- weakness.

For assessment of foot, refer to section on diabetic foot disease.

If pain is prominent, several treatment options have been shown to be effective and improve the quality of life. Tricyclic antidepressants and anticonvulsants should be

considered.

1. **Amitriptyline:** start with 12.5 to 25 mg as a starting dose and gradually titrate it up to 100–150 mg orally at bedtime

OR

2. **Carbamazepine:** should be started at 100 mg twice daily and the dose to be increased gradually to a maximum dose of 600 mg in divided doses.

OR

3. **Gabapentin:** starting dose is 100mg to 300mg one to three times daily titrating to usual effective dose 900 - 1200 mg three times daily.

Other medications that can be used are Pregabalin or Duloxetine.

Consider Vitamin B12 deficiency as a contributing factor to peripheral neuropathy in patients with long-term metformin.

Good glycaemic control together with control of other vascular risk factors are essential for control of symptoms.

6.3.2 Autonomic neuropathy

Autonomic neuropathy can present as:

- Hypoglycaemic unawareness
- Orthostatic hypotension
- Cardiac autonomic neuropathy
- Diabetic gastroparesis
- Diarrhoea
- Bladder atonia with urinary retention, asymptomatic or symptomatic urinary tract infections
- Erectile dysfunction

Orthostatic hypotension requires specialist assessment, but the patient may respond to: Fludrocortisone 0.1 to 0.3mg orally daily.

Discuss with a medical specialist if there are concerns regarding diabetic neuropathy in your patients.

6.4 Diabetic foot disease

Diabetic foot disease includes both Diabetic Foot Ulcers and Diabetic Foot Infection/ Sepsis.

Diabetic foot ulcers (DFU): is an open sore or wound that occurs in approximately 15% of patients with diabetes and is commonly located on the foot (Amogne W., 2011).

Diabetic foot infection/sepsis (DFI/DFS): DFI or DFS is a major complication of diabetic foot disease, that is defined as diabetic foot ulcers or injuries that present with infection.

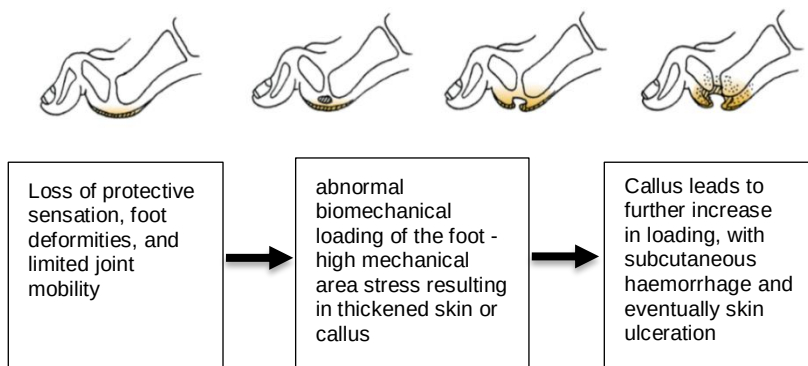
- The lifetime risk of developing a foot ulcer in patients with diabetes is more than 33% (Boulton AJ, 2008).
- Approximately 20% of people with DFU will lead to lower-extremity amputation, either minor (below the ankle), major (above the ankle) or both and 10% will die within 1 year of their first diagnosis (Hoffstand O, 2015).
- The three main types of DFU are neuropathic, ischaemic and neuroischaemic with an estimated prevalence of 35%, 15% and 50% respectively (Sidawy AN, 2019). It is important to distinguish between DFU and DFS/ DFI Because 85% of lower-limb amputations in patients with diabetes are preceded by DFU (Brocklehurst, 2023).

6.4.1 Risk factors for diabetic foot problems

The major risk factors for diabetes foot problems are:

1. Peripheral neuropathy – peripheral neuropathy and in particular sensory loss is a significant risk factor for the development of diabetic foot problems.
2. Peripheral arterial disease – poor arterial blood supply is also a significant risk factor for diabetic foot ulceration.
3. Poor glycaemic control – poor blood glucose level control increases the risk of neuropathy, vascular disease and infection.
4. Foot deformities – Foot deformity is a risk factor for ulceration. Hammer toe, claw toes and bony deformities subject the foot to high pressure and trauma that can lead to ulceration.

Figure 22. Mechanism of ulcer developing from repetitive or excessive mechanical stress.
Image: IWGDF Guidelines 2023



6.4.2 Assessment of foot ulcers

There are two classifications that will be used:

1. SINBAD system: It is important to use the individual clinical descriptors and not merely the total score. A good classification system for Audits.
2. Wound, Ischaemia and Foot Infection (WIFI): to be used in when patients have peripheral vascular disease. Needs equipment and expertise for revascularisation. And is also a good estimator of wound healing and amputation.

6.4.3 SINBAD classification system

Table 26. SINBAD classification system

Step	Category	Definition	Score	Test results/observations
1	Site	Forefoot	0	Location: Forefoot/Midfoot/Hindfoot
		Midfoot or hindfoot	1	
2	Ischaemia/ PAD	Pedal blood flow intact: at least 1 palpable pulse	0	Ischaemia/PAD severity grade: 1/2/3
		Clinical evidence of reduced pedal blood flow	1	
3	Neuropathy	Protective sensation intact	0	Vibration perception: Intact/Lost
		Protective sensation lost	1	
4	Bacterial infection	None	0	Infection severity grade:1/2/3 Temperature: Heart rate: Respiration rate: Bloods: Probe to bone: Erythema margin: Culture:
		Present	1	
5	Area	Ulcer <1cm^2	0	Length: Width: Surface Area:
		Ulcer >1cm^2	1	
6	Depth	Ulcer confined to skin and subcutaneous tissue	0	Depth:
		Ulcer reaching muscle, tendon or deeper	1	
Total		/6		

Figure 23. Foot assessment and scoring

	Site	Score
	Forefoot	0
	Midfoot	1
	Hind foot	1

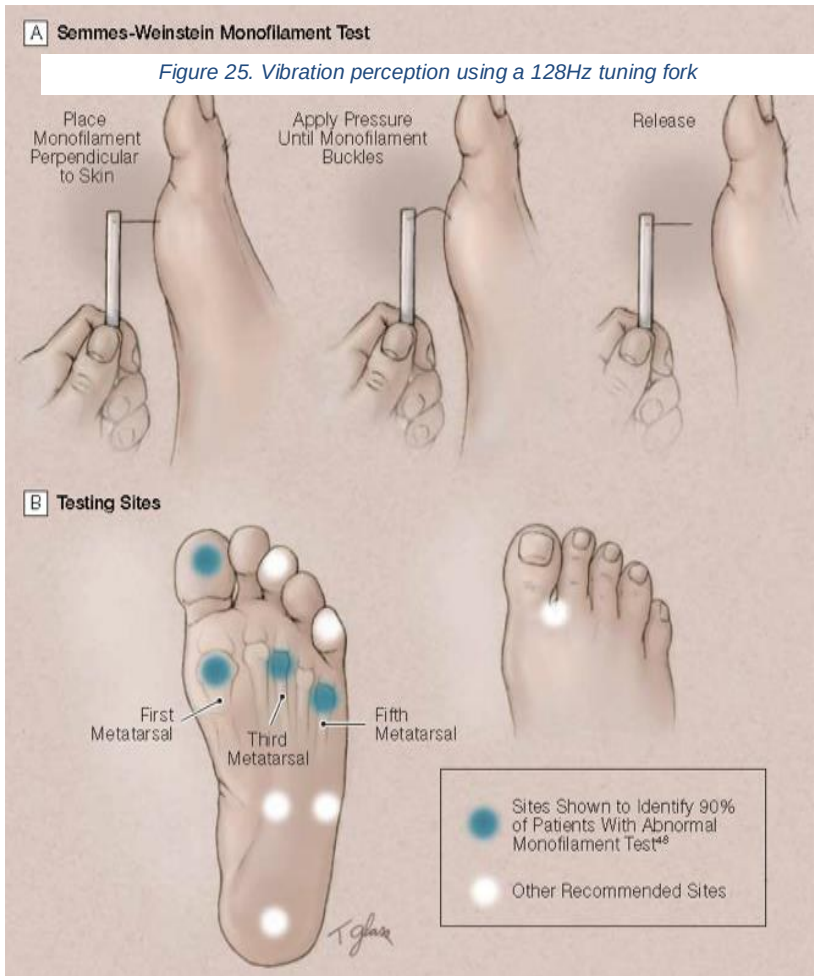
Ischaemia: Assess if pedal blood flow is intact or if there is clinical evidence of reduced blood flow. No single modality has been shown to be optimal for the diagnosis of PAD.

1. Pedal pulse either dorsalis pedis or posterior tibialis – palpation or doppler (PAD is less likely in the presence of triphasic or biphasic pedal Doppler waveforms).
2. Ankle Brachial Index (ABI) - PAD is less likely in ABI 0.9-1.3. In selected cases transcutaneous oximetry can be tested.

Neuropathy: Protective sensation can be assessed using:

1. Pressure perception: Semmes-Weinstein 10 gram monofilament

Figure 24. Pressure perception using Semmes-Weinstein 10 gram monofilament test

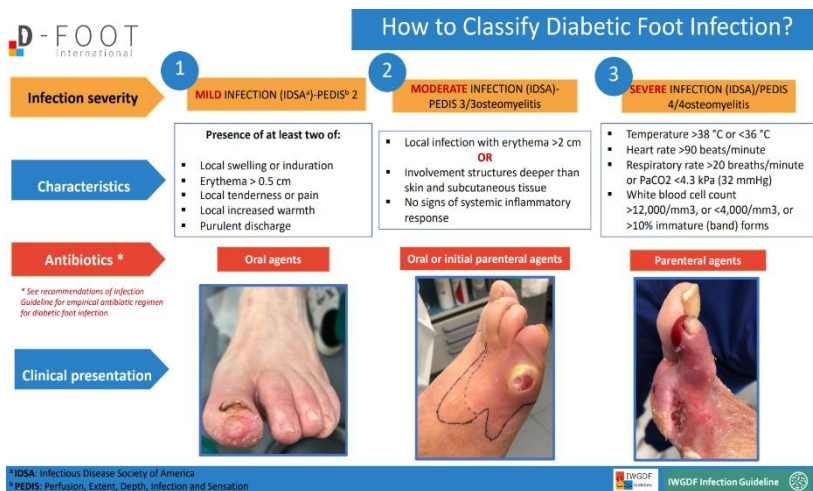


2. Vibration perception: 128Hz tuning fork

3. When monofilament or tuning fork are not available test tactile sensation: lightly touch the tips of the toes of the patient with the tip of your index finger for 1–2 seconds.

Bacterial infection

Figure 26. How to classify diabetic foot infection



Unfortunately, these signs may be blunted by neuropathy or ischaemia, and systemic findings (e.g., pain, fever, leucocytosis) are often absent in mild and moderate infections.

Area: Measure ulcer area and express in cm².

Depth: Assess ulcer depth. To aid assessment, debride any neuropathic or neuro-ischaemic ulcer that is surrounded by callus or contains necrotic soft tissue at initial presentation, or as soon as possible. Do not, however, debride a non-infected ulcer that has signs of severe ischaemia. Neuropathic ulcers can usually be debrided without the need for local anaesthesia.

- Ulcer confined to skin and subcutaneous tissue
- Ulcer reaching muscle, tendon or deeper

To rule out osteomyelitis:

- Probe the ulcer for depth
- X-ray for bony involvement
- ESR, CRP and in certain cases procalcitonin may be used.

Wound, ischaemia and foot infection (WIFI)

To be used when there is Peripheral Vascular Disease (PAD)

Table 27. Classification to be used when there is peripheral vascular disease (PAD)

Wound		Ischaemia (ABI)		Non-infected	
0	No ulcer and no gangrene	0	>0.80	0	Non-infected
1	Small ulcer and no gangrene	1	0.6–0.79	1	Mild (<2 cm cellulitis)
2	Deep ulcer and gangrene limited to toes	2	0.4–0.59	2	Moderate (>2 cm cellulitis)
3	Extensive ulcer or gangrene	3	<0.39	3	Severe

Diabetic foot sepsis/infection

Sepsis: life-threatening organ dysfunction caused by dysregulated host response to infection.

Organ dysfunction: increase in the Sequential Organ Failure Assessment (SOFA) score of 2 points or more with an overall mortality of 10% in general hospital population with suspected infection.

Septic shock: Severe sepsis with hemodynamic instability despite intravascular volume repletion. The persisting hypotension will require vasopressors to maintain MAP ≥ 65 mmHg and have a serum lactate level > 2 mmol/L. Hospital mortality is at 40%.

- qSOFA is an easy bedside calculation for Sepsis
- 3 components of qSOFA (quick)

1. Systolic blood pressure <100mmHg
 2. High respiratory rate 21
 3. Lowest Glasgow coma score under 15
- qSOFA has but better predictive value in a non-ICU setting and ER but not in an ICU setting
 - if you have 2 out of 3 parameters you have a poor outcome due to Sepsis.

Necrotising fasciitis (NF) or necrotising soft tissue infections (NSTIs): is a life-threatening soft tissue infection that affects layers of the soft tissue compartments (dermis, subcutaneous tissue, superficial fascia, deep fascia or muscle).

Diagnosis

At onset, necrotising fasciitis can be difficult to differentiate from cellulitis and other superficial infections of the skin. However early diagnosis and aggressive surgical treatment can reduce morbidity or mortality.

Table 28. Diagnosing necrotising fasciitis

History and examination	<ul style="list-style-type: none"> • Pain out of proportion to presenting sign and symptoms e.g. excruciating pain with erythema • Systemic septic signs (refer to qSOFA)
	<ul style="list-style-type: none"> • Tenderness to palpation beyond the erythematous border • Subcutaneous emphysema and crepitus • Erythema or Cellulitis • presence of bullae • Ecchymotic changes to the skin • Dysesthesia or paraesthesia

Treatment

Key concepts for treatment/management of skin and soft-tissue infections are:

1. Early diagnosis and differentiation between necrotising and non-necrotising SSTIs
2. The early launch of appropriate empiric antibacterial coverage (wide-spectrum)
3. Adequate control of infection sources, such as aggressive surgical intervention for abscess drainage and debridement of necrotising soft tissue infections (NSTIs)
4. Identification of infection-causing pathogens and applicable adjustment of antimicrobial coverage.

Foot ulcer prevention

1. Identify the person with an at-risk foot
2. Regularly inspect and examine the feet of a person at-risk for foot ulceration
3. Provide structured education for patients, their family and healthcare professionals
4. Encourage routine wearing of appropriate footwear

5. Treat risk factors for ulceration.

Identifying the person with at-risk foot

The IWGDF 2023 Risk Stratification System and corresponding foot screening frequency.

Table 29. The IWGDF 2023 Risk Stratification System

Category	Ulcer risk	Characteristics	Frequency
0	Very low	No LOPS / No PAD	Once a year
1	Low	LOPS or PAD	Once every 6–12 months
2	Moderate	LOPS + PAD or	Once of 3–6 months
		LOPS + Foot Deformity or	
		LOPS + Foot Deformity or	
3	High	LOPS or PAD, and one or more of the following: <ul style="list-style-type: none"> • history of a foot ulcer • a lower-extremity amputation (minor or major) • end-stage renal disease 	Once every 1–3 months

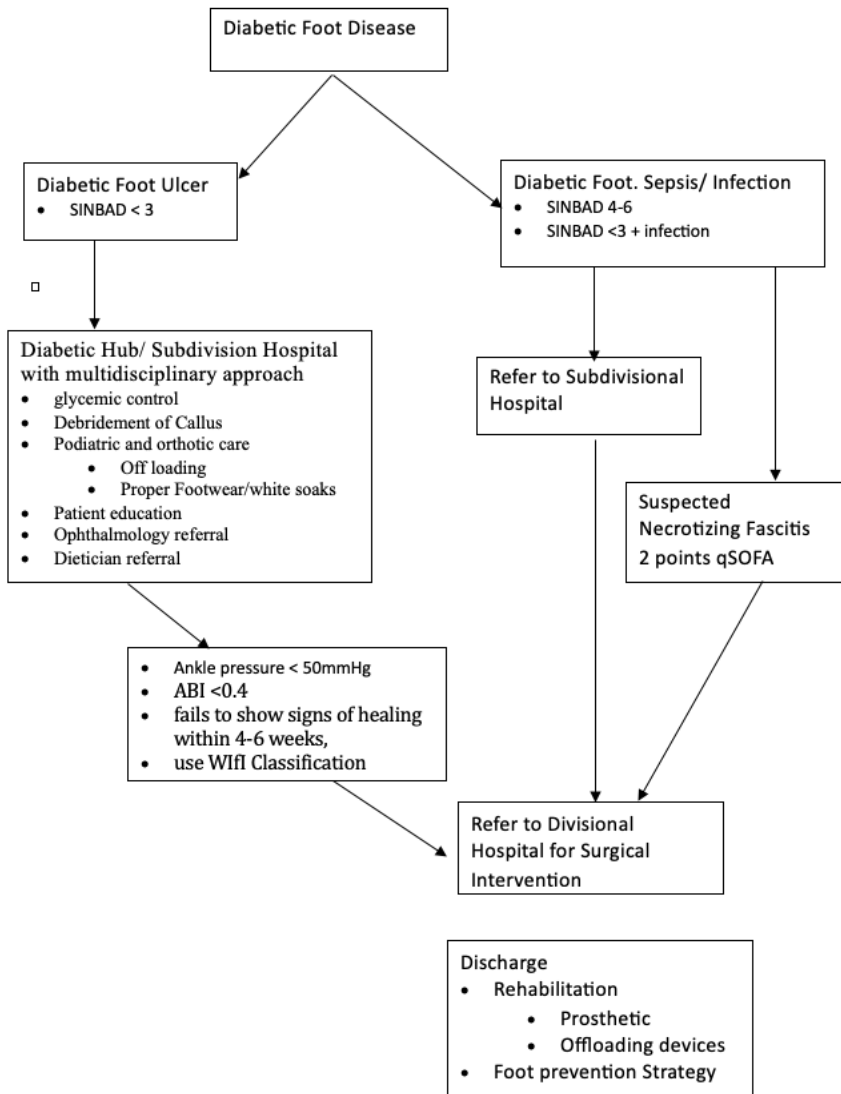
Note: LOPS = Loss of Protective Sensation; PAD = Peripheral Artery Disease;
 *Screening frequency is based on expert opinion, since there is no published evidence to support these intervals

Surveillance

Table 30. Surveillance using the IWGDF 2023 Risk Stratification System

Very low	Low	Moderate	High
Once a year	6–12 months	3–6 months	1–3 months
Diabetic Hub	Diabetic Hub	Diabetic Hub Outreach Surgical Clinic	Diabetic Hub Outreach Surgical Clinic Clinic

Figure 27. Algorithm for DFU and DFS/DFI surgical referral



Dressings: There is no dressing that is ideal for every type of wound. Selection of the appropriate dressing for a particular wound is best made after careful consideration about the cause of the wound, the way it will heal (if at all) and to what is to be achieved by the dressing.

A good dressing comprises of primary and secondary dressings with tape for adherence

- A primary dressing is one which is in direct contact with the wound, non-adherent and allows fluids to seep through (e.g. Paraffin, jelonette etc.).
- A secondary dressing is one which covers the primary dressing and absorbs fluids.
- Composite dressings would consist of 3 layers of materials and occasionally have transparent film or non-woven fabric tape border that adheres to skin.

Properties of the ideal wound dressing

- Absorb exudate but maintain a moist wound healing environment
- Allow 2 way gas and fluid exchange
- Non-adherence to the wound
- Comfortable and Conformable
- Odour absorbing
- Provide mechanical and bacterial protection
- Maintain a stable wound temperature of 37 degrees
- Require infrequent changing
- Non-toxic, non-allergenic
- Cost effective, easily available

Sloughy wounds:

A wound full of slough will require de-sloughing, either mechanically or chemically, and once it is clean, either allowed to heal by secondary intention with simple dressings or closed surgically.

- Conservative sharp and surgical debridement: Conservative sharp does not extend to healthy tissue and can be done at bedside. Surgically debridement requires Anaesthesia and may extend to healthy tissue.
- Mechanical debridement: wet to dry dressings such as normal saline, hydrotherapy etc.
- Chemical debridement: ointment or gel with enzymes that soften unhealthy tissue.
- Autolytic debridement: dressings that use your body's enzymes and natural fluids to soften bad tissue. This is done with moisture-retaining dressings that typically changed once a day.
- Biological debridement: Maggot therapy.

Granulating wounds:

A moist environment on the wound surface aids epithelialisation and many dressings are designed to maintain this environment.

Table 31. Wound grading

Wound

Grade	DFU	Gangrene
0	No ulcer Clinical description: minor tissue loss. Salvageable with simple digital amputation (1 or 2 digits) or skin coverage.	No gangrene
1	Small, shallow ulcer(s) on distal leg or foot; no exposed bone, unless limited to distal phalanx Clinical description: minor tissue loss. Salvageable with simple digital amputation (1 or 2 digits) or skin coverage.	No gangrene
2	Deeper ulcer with exposed bone, joint or tendon; generally not involving the heel; shallow heel ulcer, without calcaneal involvement Clinical description: major tissue loss salvageable with multiple (≥ 3) digital amputations or standard TMA $\pm$ skin coverage.	Gangrenous changes limited to digits
3	Extensive, deep ulcer involving forefoot and/or midfoot; deep, full thickness heel ulcer $\pm$ calcaneal involvement Clinical description: extensive tissue loss salvageable only with a complex foot reconstruction or non-traditional TMA (Chopart or Lisfranc); flap coverage or complex wound management needed for large soft tissue defect	Extensive gangrene involving forefoot and /or midfoot; full thickness heel necrosis $\pm$ calcaneal involvement

Ischaemia

Grade	ABI	Ankle systolic pressure (mmHg)	TP, TcPO ₂ (mmHg)
0	≥ 0.80	> 100	≥ 60
1	$0.6 - 0.79$	$70 - 100$	$40 - 59$
2	$0.4 - 0.59$	$50 - 70$	$30 - 39$
3	≤ 0.39	< 50	< 30

Table 32. Foot infection grading

Foot Infection

Grade	Clinical manifestations
0	<p>No symptoms or signs of infection</p> <p>Infection present, as defined by the presence of at least 2 of the following items:</p> <ul style="list-style-type: none"> ● Local swelling or induration ● Erythema > 0.5 to ≤ 2 cm around the ulcer ● Local tenderness or pain ● Local warmth ● Purulent discharge (thick, opaque to white, or sanguineous secretion)
1	<p>Local infection involving only the skin and the subcutaneous tissue (without involvement of deeper tissues and without systemic signs as described below).</p> <p>Exclude other causes of an inflammatory response of the skin (e.g., trauma, gout, acute Charcot neuro-osteoarthropathy, fracture, thrombosis, venous stasis)</p>
2	<p>Local infection (as described above) with erythema >2 cm, or involving structures deeper than skin and subcutaneous tissues (e.g, abscess, osteomyelitis, septic arthritis, fasciitis), and No systemic inflammatory response signs (as described below)</p>
3	<p>Local infection (as described above) with the signs of SIRS, as manifested by two or more of the following:</p> <ul style="list-style-type: none"> ● Temperature > 38°C or < 36°C ● Heart rate > 90 beats/min ● Respiratory rate > 20 breaths/min or PaCO₂ < 32 mm Hg ● White blood cell count > 12,000 or < 4000 cu/mm or 10% immature (band) forms

ABI: Ankle-Brachial Index; PaCO₂: Partial Pressure of Carbon Dioxide; SIRS: Systemic Inflammatory Response Syndrome; TcPO₂: Transcutaneous Partial Oxygen Pressure; TMA: Transmetatarsal Amputation; TP: Toe Pressure

7.0 Preoperative management

Purpose: The purpose of this guideline is to provide guidance on the perioperative management of patients with diabetes. This guideline is based on the 2022 American Diabetes Association's *Management of diabetes in the perioperative setting*.

Target audience: This guideline is intended for use by healthcare professionals involved in the care of patients with diabetes who are undergoing surgery. This includes anaesthetists, surgeons, nurses, and other allied health professionals.

Scope

This guideline covers the following topics:

- Preoperative assessment and optimisation of diabetes control
- Intraoperative management of diabetes
- Postoperative management of diabetes

Goals

The goals of perioperative diabetes management are to:

- Reduce patient morbidity and mortality
- Avoid clinically significant hyper- or hypoglycaemia
- Maintain acid/base, electrolyte, and fluid balance
- Prevent ketoacidosis
- Establish blood glucose measurements less than 180 mg/dL (7mmol/l) in critical patients and less than 140 mg/dL (10mmol/l) in stable patients

7.1 Preoperative assessment

- Obtain a complete medical history, including the patient's diabetes type, insulin regimen, and any other medical conditions.
- Review the patient's recent HbA1c levels to assess level of diabetes control.
- Perform a physical examination, including a blood pressure check, pulse oximetry, and fingerstick glucose measurement.
- Assess the patient's knowledge and ability to self-manage their diabetes.
- Develop a plan for perioperative diabetes management in collaboration with the patient and their diabetes care team.

7.2 Intraoperative management

- Monitor blood glucose levels every 1–2 hours.
- Administer insulin as needed to keep blood glucose levels in the target range.
- Provide supplemental fluids and electrolytes as needed.
- Monitor for and treat hypoglycaemia and hyperglycaemia.

7.3 Postoperative management

- Monitor blood glucose levels every 1–2 hours.
- Administer insulin as needed to keep blood glucose levels in the target

range.

- Provide supplemental fluids and electrolytes as needed.
- Monitor for and treat hypoglycaemia and hyperglycaemia.
- Transition the patient back to their usual diabetes management regimen as soon as possible.

7.4 Additional considerations

- Patients with type 1 diabetes are at increased risk for diabetic ketoacidosis (DKA). DKA is a life-threatening complication that can occur if blood glucose levels are not controlled in the perioperative period.
- Patients with type 2 diabetes who are taking oral anti-diabetic medications may need to have their medications temporarily discontinued or adjusted in the perioperative period.
- Patients with diabetes who are scheduled for surgery should be admitted to the hospital the day before surgery to allow for time to optimise their diabetes control.

8.0 Targets for control in diabetes

It is important to have a set of targets for diabetes control. These targets are usually set by international diabetes agencies based on major research findings. See table below. These targets need to be discussed between the patient and the doctor before initiating treatment and during each follow-up visit. (This can be documented in the personal Diabetes Record Book for the patients).

Table 33. Targets for control in diabetes

<i>Indicator</i>	<i>Good</i>	<i>Poor</i>
Fasting Blood glucose (mmol/L) FBS	4.0 – 7.0	≥7.0
Random Blood Sugar (mmol/l) RBS	5.0 - 10	≥10.0
*HbA1c (%)	< 7%	≥7%
Total cholesterol (mmol/L)	< 4.0	≥4
HDL-cholesterol (mmol/L)	> 1.0	≤ 1.0
LDL-cholesterol (mmol/L)	< 2.0	≥ 2.0
Triglycerides (mmol/L)	< 1.5	≥ 1.5
**Blood pressure (mm Hg)	<130/80	≥130/80
***Body mass index (kg/m ²) Ideal BMI: 20–25 kg/m ²	< 25	≥25

**HbA1c – amount of circulating glycosylated haemoglobin, a measure of the overall control over preceding 3 months.*

***Individualise target for certain group of patients e.g. CKD, elderly patient.*

9.0 Diabetes in children

9.1 Introduction

The epidemiology, pathophysiology, developmental considerations, management and response to therapy in paediatric-onset diabetes are different from adult diabetes and will be discussed separately here.

Most diabetes in children is type 1 diabetes, resulting in lifelong insulin dependency. The incidence of type 1 diabetes in Fiji is very low (28 cases diagnosed over 11 years) with an estimated prevalence of <1 per 100 000 below 15 years. Furthermore, its occurrence is markedly more frequent in Indo-Fijians than in native Fijians.

Type 2 diabetes can also occur in children (mainly in adolescents). Other rarer types can also occur, even in neonates.

9.2 Aim

To provide a guideline for the management of diabetes in children and adolescents.

9.3 Parameters

This guideline applies to children from the neonatal period up to < 15 years old.

9.4 Definitions

9.4.1 Types of diabetes in children

Type 1 Diabetes Mellitus (T1DM) is the most common form of diabetes in youth. Children with type 1 diabetes typically present with polyuria/polydipsia, and approximately half present with diabetic ketoacidosis (DKA).

Type 2 diabetes mellitus (T2DM) in youth has increased over the past 20 years due to increased obesity. It differs from T1DM and T2DM in adults in that it has a more rapid, progressive decline in β -cell function and accelerated development of diabetes complication

Neonatal Diabetes (presenting in the first six months of life) results from the inheritance of a mutation or mutations in a single gene (monogenic diabetes).

Monogenic diabetes outside the neonatal period. This was previously known as MODY – Maturity Onset Diabetes in the Young. These cases generally have a strong family history of diabetes.

Diabetes associated with syndromes such as Down Syndrome, Prader-Willi Syndrome.

Gestational diabetes can also occur in pregnancy in adolescence.

9.4.2 Diagnostic criteria for diabetes

Table 34. Diagnostic criteria for diabetes

Test (any can be used)	Comments
HgbA1C $\geq 6.5\%$	The test should be performed in a laboratory using a method that is NGSP certified and standardised to the DCCT assay.
FPG ≥ 126 mg/dL (7.0 mmol/L)	Fasting is defined as no caloric intake for at least 8 hours.
2-hour plasma glucose ≥ 200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test (OGTT)	The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75-gram anhydrous glucose dissolved in water.
Random plasma glucose ≥ 200 mg/dL (11.1 mmol/L)	In a patient with classic symptoms of hyperglycaemia or hyperglycaemic crisis

9.5 Screening

Risk-based screening for T2DM or pre-diabetes in asymptomatic children and adolescents in a clinical setting

Table 35. Risk-based screening for T2DM or pre-diabetes in asymptomatic children and adolescents

Consider in youth* who are overweight (≥ 85 th centile) or obesity (≥ 95 th centile) and have ≥ 1 risk factor: <ol style="list-style-type: none">1. Maternal history of diabetes or GDM during the child's gestation2. Family history of type 2 DM in 1st or 2nd degree relative3. Race/ethnicity (Native American, African American, Latino, Asian American, Pacific Islander)4. Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidaemia, polycystic ovary syndrome, or small for gestational age birthweight)
<p>*After the onset of puberty or after 10 years of age, whichever occurs earlier.</p> <p>If tests are normal, repeat testing at a minimum of 3-year intervals, or more frequently if BMI is increasing or risk factor profile deteriorating, is recommended. Reports of type 2 diabetes before age 10 years exist, and this can be considered with numerous risk factors.</p>

9.6 Referral

- All paediatric patients suspected to be having diabetes should be referred to paediatric registrar on call. Patient will be booked to Child SOPD/Consultant clinic and plans made accordingly.
- If presenting in an emergency e.g. diabetic ketoacidosis again should be referred immediately.
- All patients diagnosed with Diabetes will be referred to Diabetic Hub and co-managed.

- Once patient reaches 15 years, referral made to Diabetic Hub (and Internal Medicine) department to take over management.

9.7 Clinical presentation

9.7.1 Type 1 diabetes mellitus

1. **Classic new onset** of chronic polydipsia, polyuria (e.g. nocturia and bedwetting, increased frequency and/or unusually wet diapers), and weight loss with hyperglycaemia and ketonemia (or ketonuria) is the most common presentation of childhood T1DM.
2. **Diabetic ketoacidosis (DKA)** (hyperglycaemia and ketoacidosis) is the second most common form of presentation for T1DM in most populations. In addition to polyuria, polydipsia, and weight loss, patients with ketoacidosis may present with a fruity-smelling breath and neurologic findings, including drowsiness and lethargy.
3. **Silent (asymptomatic) incidental discovery.** Some children will be diagnosed with T1DM before the onset of clinical symptoms. This presentation is least common and typically occurs in children who have another close family member with T1DM and are being closely monitored.

9.7.2 Characteristics of Type 1 and Type 2 DM in children and adolescents

Table 36. Characteristics of Type 1 and Type 2 DM in children and adolescents

	Type 1 diabetes	Type 2 diabetes
Prevalence	Common, increasing	Increasing
Age at presentation	Throughout childhood (bimodal, 1st peak at 4–6 years and a 2nd peak at 10–14 years)	Puberty
Onset	Typically, acute severe	Insidious to severe
Ketosis at onset	Common	5 to 10%
Affected relative	5 to 10%	75 to 90%
Female: male	1:1	Approximately 2:1
Inheritance	Polygenic	Polygenic
HLA-DR3/4	Strong association	No association
Ethnicity	Most common in non-Hispanic whites	All
Insulin secretion	Decreased/absent	Variable
Insulin sensitivity	Normal when controlled	Decreased
Insulin dependence	Permanent	Variable
Obese or overweight	20 to 25% overweight	>80% obese
Acanthosis nigricans	12%	50 to 90%

Pancreatic antibodies	Yes*	No
-----------------------	------	----

**Autoantibodies to insulin (IAA), islet cell cytoplasm (ICA), glutamic acid decarboxylase (GAD), islet tyrosine phosphatase (IA2 beta), or zinc channel antibody (ZnT8) are present in 85 to 98% of patients.*

9.8 Management

9.8.1 Challenges

- Unpredictability of a toddler's dietary intake
- Activity level
- Unable to communicate signs of hypo/hyperglycaemia and DKA
- Because of these considerations, the management of a child with T1DM must take in to account the age and developmental maturity of the child.

9.8.2 Goals of management

- Balance the goal of strict glycaemic control against the goal of avoiding severe hypoglycaemia.
- Maintain normal growth, development and emotional maturation and support.
- Train patient and family to be independent with diabetes management.
- Set realistic goals for each child and family.

9.8.3 Initial management

The initial phase begins at the time of diagnosis. In these first few days, the family begins to understand the disease process and is trained to successfully:

- measure blood glucose concentrations
- administer insulin
- recognise and treat hypoglycaemia

measure blood or urine ketone concentrations

9.8.4 Ongoing care

Multidisciplinary approach:

- Dietician
- Nurse educator
- Diabetic Hub
- Mental health professionals

As the child grows older, education and training are directed toward increased autonomy and self-management for the patient.

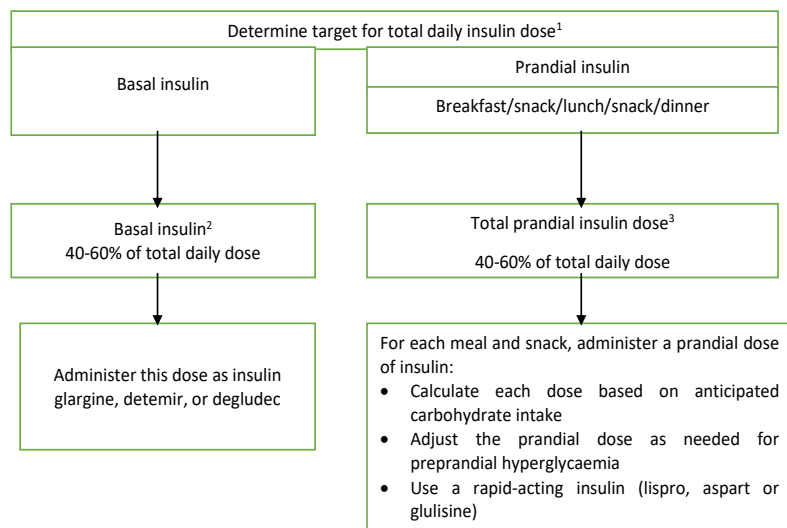
9.8.5 Overview of insulin therapy

Insulin administration is the core treatment for all patients with T1DM.

Insulin therapy tailored for individual patients based on glycaemic control.

Monitoring glycaemic control is done by monitoring A1c and blood glucose

Figure 28. Algorithm for initial dosing of insulin for a child with newly diagnosed T1DM using multiple daily injections



¹ Total daily insulin dose for children with newly diagnosed type 1 diabetes mellitus generally is between 0.3 and 1 units/kg. Pre-pubertal children require doses on the lower end of this range (0.3 to 0.7 units/kg/day). Higher doses (e.g., 0.7 to 1 units/kg/day) are needed in pubertal children or patients in ketoacidosis or on corticosteroids and, sometimes, for those with obesity. These doses are titrated up or down as needed depending on the patient's response.

² For most patients, the basal insulin requirement is approximately 50% of the estimated total daily insulin dose. The proportion may be lower (e.g., 40% of the total daily dose) in children who are in a rapid growth phase. The proportion may be higher (e.g., 60% of the total daily dose) for those on a low-carbohydrate diet.

³ The total prandial insulin dose may vary each day, depending on food intake and any dose corrections for blood glucose above the target range.

⁴ Basal insulin is usually given once daily and usually in the evening. However, some children do better with two divided doses, e.g., those who tend to have nocturnal hypoglycaemia or when detemir insulin is used. Insulin degludec may also be used; it has a longer duration of action but is still given once daily.

The above preparations of insulin (glargine, detemir, degludec, lispro, aspart and glulisine) are currently not available in government pharmacies.

We treat with Mixtard isophane at same above-mentioned doses:

- Pre-pubertal (0.3-0.7 U/kg/day)
- Pubertal children (0.7-1u/kg /day)

2/3 of the dose given pre-breakfast and 1/3 of dose given pre-dinner.

All children with type 1 diabetes are currently co-managed and followed up in the paediatric clinic and the Diabetic Hub.

9.8.6 Targets for glycaemic control for T1DM

A1c goals must be individualised and reassessed over time.

Table 37. A1c targets and indications

Target HgbA1C	Indication
<7%	recommended for most children and adolescents
<7.5%	younger patients (active toddlers); patients who cannot articulate symptoms of hypoglycaemia; have hypoglycaemia unawareness; or who cannot check blood glucose regularly
<8%	history of severe hypoglycaemia, have limited life expectancy, or where the harms of treatment are greater than the benefits
<6.5%	Honeymoon phase

Target blood glucose: 4.4-7.2 mmol/L before meals and 4.4-7.8 mmol/L at bedtime and overnight.

9.9 Age-based care

The management plan for childhood-onset T1DM depends on the child's age, cognitive ability, and emotional maturity, which affect his or her ability to communicate symptoms and participate in self-management.

Table 38. Management plan for childhood-onset T1DM

Developmental stage (approximate ages)	Normal developmental tasks	Type 1 diabetes management priorities	Family issues in type 1 diabetes management
Infancy (0 to 12 months)	Developing a trusting relationship/"bonding" with primary caregiver(s)	Preventing and treating hypoglycaemia Avoiding extreme fluctuations in blood glucose levels	Coping with stress Sharing the "burden of care" to avoid parent burnout
Toddler (13 to 36 months)	Developing a sense of mastery and autonomy	Preventing and treating hypoglycaemia Avoiding extreme fluctuations in blood glucose levels due to irregular food intake	Establishing a schedule Managing the "picky eater" Setting limits and coping with the toddler's lack of cooperation with regimen Sharing the burden of care
Preschooler and early elementary school-age (3 to 7 years)	Developing initiative in activities and confidence in self	Preventing and treating hypoglycaemia Coping with unpredictable appetite and activity Positively reinforcing cooperation with regimen Trusting other caregivers with diabetes management	Reassuring the child that diabetes is no one's fault Educating other caregivers about diabetes management
Older elementary school-age (8 to 11 years)	Developing skills in athletic, cognitive, artistic, and social areas	Making diabetes regimen flexible to allow for participation in school or peer activities	Maintaining parental involvement in insulin and blood glucose monitoring tasks, while allowing for independent self-

	Consolidating self-esteem with respect to the peer group	Child learning short- and long-term benefits of optimal control	care for "special occasions" Continuing to educate school and other caregivers
Early adolescence (12 to 15 years)	Managing body changes Developing a strong sense of self-identity	Managing increased insulin requirements during puberty Diabetes management and blood glucose control becoming more difficult Weight and body image concerns	Renegotiating parents' and the teen's roles in diabetes management to be acceptable to both Learning coping skills to enhance ability to self-manage Preventing and intervening with diabetes-related family conflict Monitoring for signs of depression, eating disorders, and risky behaviours

9.10 Diabetic Ketoacidosis (DKA) is an endocrine emergency.

- It occurs in new onset and established T1DM due to decreased circulating insulin, insulin resistance and increased counter-regulatory hormones.
- It can also occur in children with T2DM (and particularly in African American adolescents with obesity), although at lower rates than those observed in T1DM.
- **Early recognition, initial treatment and transfer to the nearest divisional hospital is of utmost importance.**

9.10.1 Definition

DKA is defined by the presence of all of the following in a patient with diabetes:

Hyperglycaemia – Blood glucose >200 mg/dL (11 mmol/L)

Metabolic acidosis – Venous pH <7.3 or serum bicarbonate <15 mEq/L (15 mmol/L)

Ketosis – Presence of ketones in the blood (>3 mmol/L beta-hydroxybutyrate) or urine ("moderate or large" urine ketones)

Table 39. Urine ketone and serum ketone levels

Urine ketone levels	Serum ketone levels
Trace	0.05 g/dl
+1	0.15 g/dl
+2	0.4 g/dl
+3	0.8 g/dl
+4	1.6 g/dl

Severity

Severity of DKA:

- Mild – pH 7.2 to 7.3; bicarbonate 10 to 15 meq/L
- Moderate – pH 7.1 to 7.2; bicarbonate 5 to 10 meq/L
- Severe – pH <7.1; bicarbonate <5 meq/L.

For full information on diagnosis and treatment/ management of DKA please refer to PICU guidelines under DKA via the Host App.

Hyperosmolar hyperglycaemic state (HHS)

Distinguished from DKA by:

1. Marked hyperglycaemia (Blood Glucose > 33.3 mmol/L or 600 mg/dL)
2. Minimal acidosis (Venous pH > 7.25, or Arterial pH > 7.30 and serum HCO₃ > 15mmol/L)
3. Absent to Mild Ketosis
4. Marked elevation in serum osmolality (> 320 mOsm/L)

**More common in Type 2 diabetes mellitus*

9.11 Type 2 diabetes

9.11.1 Management

- Type 2 diabetes is characterised by insulin resistance (the insulin produced works less effectively), and often also insufficient insulin production. It is increasingly being seen in children, particularly older children who are overweight and inactive, who have a family history of type 2 diabetes or in those who are of particular ethnic backgrounds where type 2 in adults is very prevalent.
- Children with type 2 diabetes usually lack the antibodies seen in type 1 (although there can be overlap between the two conditions). They commonly have acanthosis nigricans (thickened and darkened skin at the base of the neck and in the axillae). Other features of the metabolic syndrome may also be present.
- Even with the onset of type 2 diabetes, many people do not have the dramatic symptoms compared to those with type 1 diabetes. However, type 2 diabetes

can sometimes present with severe symptoms and signs including dehydration and ketoacidosis – like type 1 diabetes. This has been reported in up to 25% of type 2 presentations in young people and requires management as in type 1.

- Management of type 2 diabetes includes medication (metformin, and usually insulin) at diagnosis if blood glucose levels are >14 mmol/l (>250 mg/dl), or HbA1c > 9% (75 mmol/mol). GLP-1 receptor agonists indicated for use in youth can also be used in those ≥10 years if there are no contraindications (see management algorithm below).
- Lifestyle changes are also needed, with a healthy eating plan, appropriate exercise and weight reduction.

9.11.2 Recommended glycaemic targets Type 2 DM

Table 40. Recommended glycaemic targets Type 2 DM

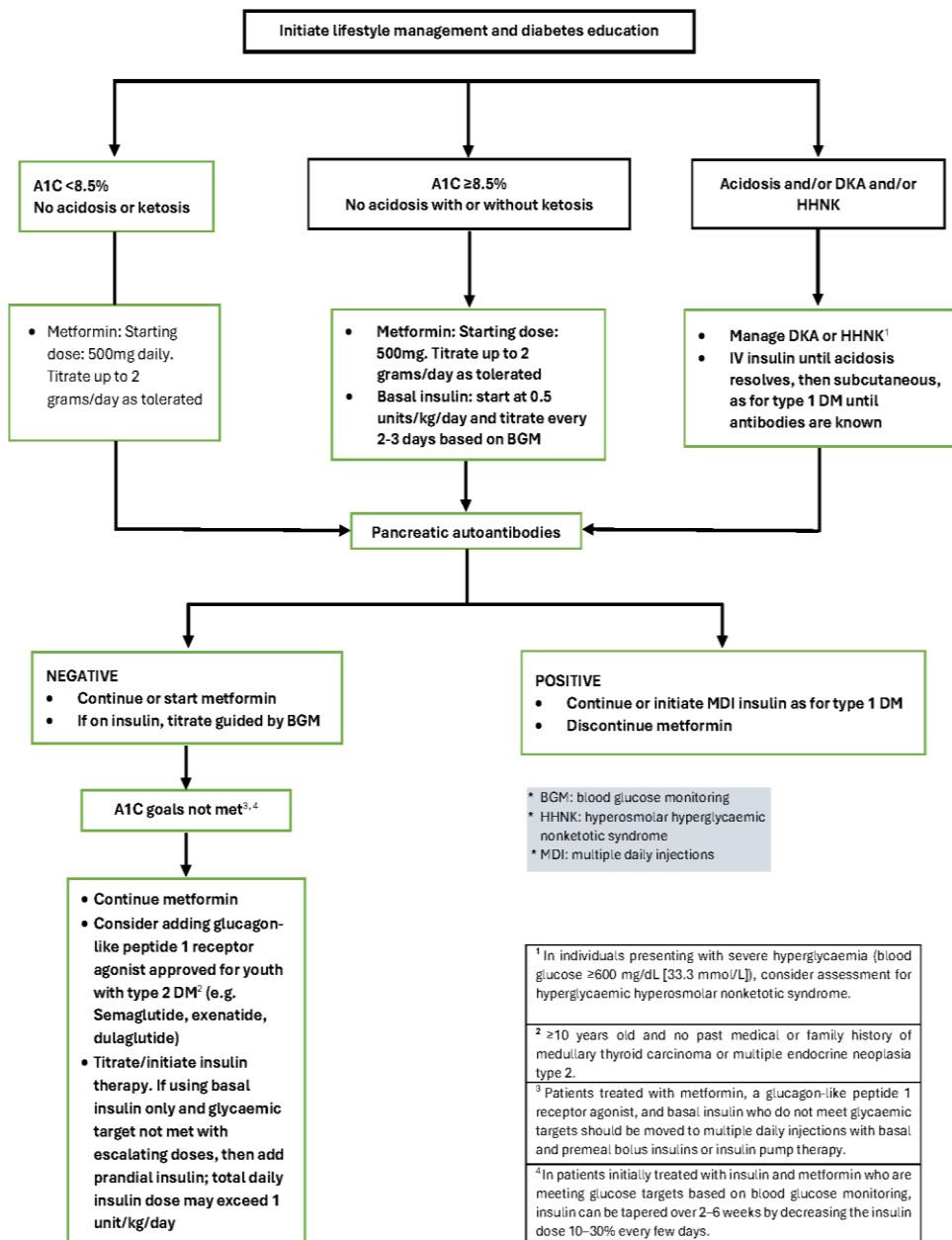
Target HgbA1C	Comments
<7%	Most children and adolescents with T2DM
<6.5%	Selected patients as those with short duration of diabetes or those treated with lifestyle modification or metformin only who have significant weight improvement
7.5%	If with increased risk of hypoglycaemia

* **BGM** – blood glucose monitoring

* **HHNK** – hyperosmolar hyperglycaemic nonketotic syndrome

* **MDI** – multiple daily injections

Figure 29. Management algorithm of new-onset diabetes in youth with overweight or obesity with clinical suspicion of type 2 diabetes



9.12 Other causes of diabetes

9.12.1 Monogenic diabetes (formerly referred to as maturity-onset diabetes of the young [MODY])

The diagnosis of monogenic diabetes should be considered in patients diagnosed with noninsulin-dependent diabetes at a young age (<25 years) with the following findings:

- a. Diabetes diagnosed within the first 6 months of life (with occasional cases presenting later, mostly INS and ABCC8 mutations).
- b. Diabetes without typical features of type 1 or type 2 diabetes (negative diabetes-associated autoantibodies, no obesity, lack of acanthosis nigricans, especially a strong family history of diabetes - autosomal dominant transmission in three generations). Many different genetic abnormalities have been identified, each leading to a different type of disease.
- c. Stable, mild fasting hyperglycaemia (100–150 mg/dL [5.5–8.5 mmol/L]), stable A1C between 5.6% and 7.6% (between 38 and 60 mmol/mol), especially if no obesity.

9.12.2 Neonatal diabetes mellitus

- Neonatal diabetes is a rare cause of hyperglycaemia in infants.
- It can be transient or permanent and usually is caused by mutations in one of several genes that encode proteins that affect the function of the pancreatic beta cell (e.g., proteins that are subunits of the ATP-sensitive potassium channel).
- Most of the infants are small for gestational age, and they present with weight loss, volume depletion, hyperglycaemia, and glucosuria with or without ketonuria and ketoacidosis.
- The natural history and management of diabetes in these infants depends on the genetic defect.

9.13 Transition from paediatric to adult care

Paediatric diabetes providers should begin to prepare youth for transition to adult health care in early adolescence and, at the latest, at least 1 year before the transition.

9.14 Infant of a diabetic mother (IDM)

9.14.1 Poor maternal glycaemic control during embryogenesis can result in a four to eight-fold increase in congenital malformations including:

- cardiac defects (present in up to 30%)
- CNS defects (including anencephaly, spina bifida, meningomyelocele)

- genitourinary and limb defects (e.g., Caudal Dysplasia or Regression Syndrome – rare disorder (1/25000) but is the most specific malformation related to diabetes; 300-400 times more often in IDMs.

The IDM needs to be supported from before conception. Preconception glucose control prevents birth defects.

9.14.2 Infants born to mothers with glucose intolerance are at an increased risk of morbidity and mortality related to the following:

- Respiratory distress syndrome – risk persists up to 38 weeks gestation
- Growth abnormalities (large for gestational age [LGA], small for gestational age [SGA])
- Hyperviscosity secondary to polycythaemia
- Hypoglycaemia
- Congenital malformations
- Hypocalcaemia, hypomagnesaemia, and iron abnormalities
- Birth injury e.g. shoulder dystocia with potential brachial plexus injury

Mothers must be closely monitored throughout pregnancy. If optimal care is provided, the perinatal mortality rate, excluding congenital malformations, is nearly equivalent to that observed in normal pregnancies.

9.14.3 Neonatal management

- Babies whose birthweights are between the 10th and 90th percentiles and therefore appropriate for gestational age (not growth-restricted or macrosomic) and/or infants of diabetic mothers not on insulin are at low risk for hypoglycaemia and can be safely screened on the postnatal ward to keep mother and baby together.
- Management of hypoglycaemia involves: (*full management details on neonatal hypoglycaemia can be also found in NICU guidelines.*)
 1. CBG monitoring: Blood glucose monitoring is required for:
 - a. infants of a woman who has diabetes requiring insulin (type 1, type 2 or gestational diabetes)
 - b. Infants of a woman with diet-controlled diabetes (pre-existing or gestational)
 2. Early, frequent oral feeding (preferably breast milk)
 3. Hypoglycaemia if CBG < 2.6 mmol/L.

9.14.4 Clinical features: Most infants are asymptomatic. Symptoms may include:

- Poor feeding
- Jitteriness and irritability
- Hypotonia and lethargy
- High-pitched cry
- Apnoea and cyanosis

- Seizures

9.14.5 Management: Treatment at sub-divisional hospital in consultation with local paediatric team

- If able to feed and asymptomatic → feed immediately, preferably breastmilk.
- Repeat CBG in 1 hour (target CBG > 2.6mmol/L)
- If symptomatic or enteral feeding contraindicated, commence IV Dextrose bolus 2mls/kg of D10% and repeat CBG in 30 mins, Discuss immediately with paediatric team
- If no IV access, may give 2mls/kg D 10% PO or NG.

9.14.6 Long-term prognosis of IDM – “diabetes begets diabetes”

- ↑ childhood obesity
- ↑ impaired glucose tolerance
- subtle neuro-psychological effects

9.15 Others

- Children with diabetes should receive all immunisations as per Fiji Immunisation Schedule plus influenza vaccine yearly.
- All children 5 years and over with diabetes are advised to get the COVID-19 vaccine.

Breastfeeding is strongly recommended. It decreases the long-term risk for obesity, DM, hypertension and cardiovascular disease. There is a 4% reduction in risk of being overweight per month of breastfeeding. Children breastfed for at least 2 months had lower rates of T2DM.

10.0 Diabetes in pregnancy

The following classification system for diabetes in pregnancy is based on the mechanism of disease and correlates with pregnancy outcome:

Type 1 diabetes (autoimmune beta cell destruction, usually leading to absolute insulin deficiency):

- Without vascular complications
- With vascular complications (e.g., nephropathy, retinopathy, hypertension, atherosclerotic cardiovascular disease, etc).

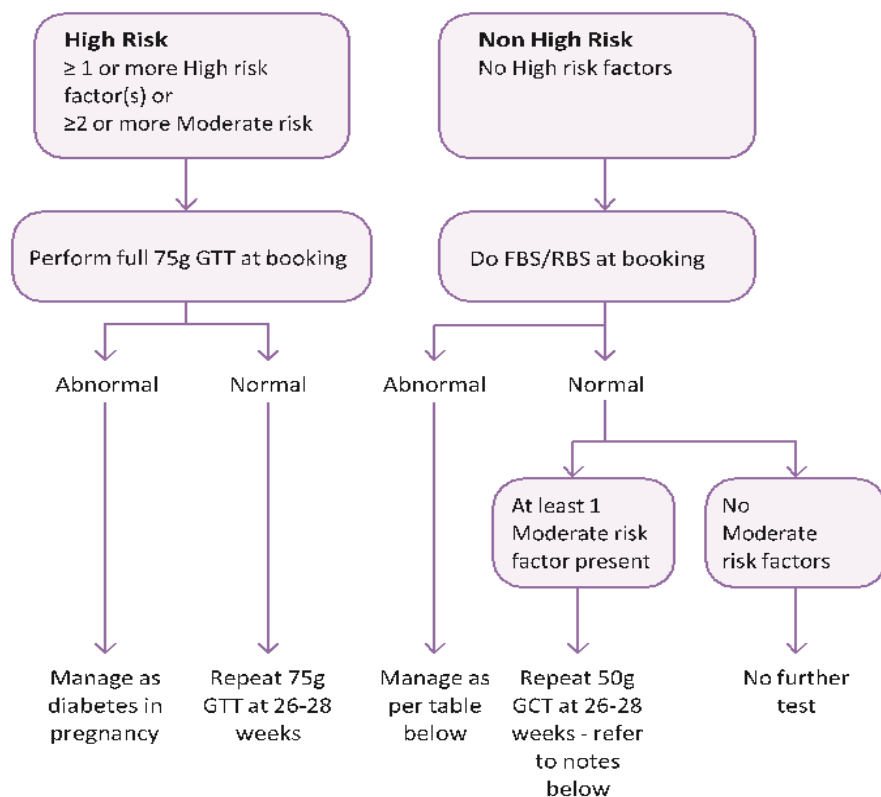
Type 2 diabetes (progressive loss of insulin secretion, often in the setting of insulin resistance):

- Without vascular complications
- With vascular complications (e.g., nephropathy, retinopathy, hypertension, atherosclerotic cardiovascular disease, etc)

Gestational diabetes mellitus (GDM) –Traditionally referred to any pregnant woman with abnormal glucose tolerance first recognised at any time during pregnancy. A more contemporary definition is: diabetes diagnosed in the 2nd or 3rd trimester that was not clearly present prior to conception.

Appropriate management of both diabetes in pregnancy and gestational diabetes mellitus is critical at every phase of pregnancy to avoid poor clinical outcomes in both mother and baby.

Risk marker assessment of all pregnant women at booking



Notes

- The 50g GCT screening test can be replaced by a full 75g GTT if this is preferred by the patient and is easier to organise locally.
- **At ANY stage of the pregnancy** if there is clinical suspicion that diabetes may be present, then prompt testing with 75g GTT should be organised.

Table 41 Risk markers for diabetes in pregnancy

High-risk group for GDM	Moderate risk group for GDM
<ol style="list-style-type: none"> 1. Maternal age over 35 years 2. Family history of diabetes in parents or siblings 3. Past history of abnormal glucose tolerance 4. Previous large babies weighing > 4.0 kg at birth 5. Polycystic ovary syndrome (PCOS) 6. Persistent glycosuria 7. Obesity with BMI > 40 8. Previous unexplained perinatal loss, or birth of a malformed baby 9. Current use of glucocorticoids 	<ol style="list-style-type: none"> 1. Obesity with BMI > 30 2. Significant weight gain in early adulthood and between pregnancies 3. Previous large babies weighing > 4.0 kg at birth 4. Past history of recurrent miscarriages, ≥ 3 5. Glycosuria at the first antenatal clinic 6. Pre-existing hypertension

Initial risk assessment and diagnostic criteria

The WHO updated recommendation on the diagnosis of GDM and diabetes in pregnancy (WHO, Aug 2021) states that: Hyperglycaemia first detected at any time during pregnancy should be classified as either as GDM or diabetes mellitus in pregnancy, according to WHO criteria below (*WHO guideline on diabetes in pregnancy, 2016*):

WHO Criteria for classification of GDM and DM in pregnancy

Test	GDM should be diagnosed at any time in pregnancy if one or more of the following criteria are met:	Diabetes mellitus in pregnancy should be diagnosed if one or more of the following criteria are met:
Fasting plasma glucose	≥ 5.1–6.9 mmol/L (92–125 mg/dL)	≥ 7.0 mmol/L (126 mg/dL)
1-hour plasma glucose following a 75 g oral glucose load	10.0 mmol/L (180 mg/dL)	NA

Test	GDM should be diagnosed at any time in pregnancy if one or more of the following criteria are met:	Diabetes mellitus in pregnancy should be diagnosed if one or more of the following criteria are met:
2-hour plasma glucose following a 75 g oral glucose load	8.5–11.0 mmol/L (153–199 mg/dL)	11.1 mmol/L (200 mg/dL)
Random plasma glucose	NA	≥ 11.1 mmol/L (200 mg/dL) in with diabetes symptoms
A1C test or HbA1c test	NA	≥ 6.5 percent using a standardised assay

NOTE:

For detailed management of Diabetes in Pregnancy, refer to Section 2 under 2.1

Risk of adverse outcomes in pregnancy

The risk of adverse pregnancy outcomes increases continuously as maternal fasting, the one hour and two-hour oral plasma glucose level increases. Conversely, it is also recognised that glycaemic targets in the treatment of hyperglycaemia in pregnancy vary between centres and clinicians globally. The target levels are:

- Fasting, pre-prandial, and nocturnal glucose – 3.9 to 5.1 mmol/L) and
- Two-hour postprandial glucose – 6.1 to 7.8 mmol/L

Antenatal care for GDM patients

All patients defined as having gestational diabetes need to be referred to a divisional hospital for initiation of therapy. Subsequent therapy can be conducted in sub-divisional hospital settings, but there should be ongoing patient monitoring and consultation with the O&G unit of the divisional hospitals.

Treatment of GDM is important to minimise maternal and neonatal morbidity. A meta-analysis of randomised trials, compared with no treatment, appropriate management of GDM (nutritional therapy, self-blood glucose monitoring, administration of insulin when target blood glucose concentrations are not met with diet alone) resulted in reductions in:

- Pre-eclampsia
- Birthweight > 4 kg
- Shoulder dystocia

Other adverse outcomes have been reported, such as:

- Hydramnios
- Foetal organomegaly (hepatomegaly, cardiomegaly)
- Birth trauma
- Operative delivery
- Perinatal mortality.
- Neonatal respiratory problems
- Metabolic complications (hypoglycaemia, hyperbilirubinemia, hypocalcaemia, erythraemia).

The only identified potential harm from treatment of GDM was an increased number of antenatal visits and the patients and support persons should be advised of this at diagnosis.

Patients with GDM should receive nutritional counselling by a dietitian upon diagnosis and be placed on an appropriate diet.

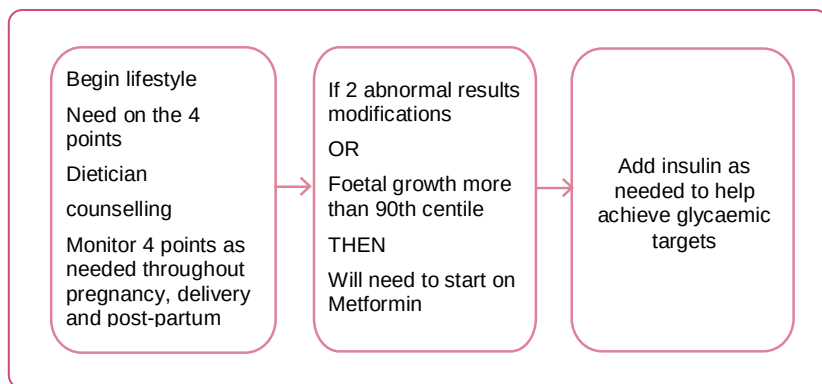
The goals are to:

- Achieve normoglycemia
- Prevent ketosis
- Provide adequate nutrition
- Provide adequate gestational weight gain based on maternal BMI
- Contribute to foetal wellbeing

Indications for pharmacotherapy

- Glucose levels above the target range – If glucose targets cannot be maintained by diet therapy, then medication should be initiated, but the degree of hyperglycaemia at which the medication should start has not been definitively determined and varies among providers. **It is recommended to initiate medications(s) when over 30% (>1) of the blood glucose values in a week are above target glucose thresholds.** Refer to Algorithm 1. The initiation of medication must be discussed with divisional O&G team.
- Foetal overgrowth – Data from some randomised trials suggest insulin, in the subgroup of patients with indirect evidence of foetal hyperinsulinemia (e.g. abdominal circumference > 75th percentile or estimated foetal weight [EFW] ≥ 90th percentile on the early third-trimester sonogram) can reduce the occurrence of macrosomia and large for gestational age in newborns, even in patients with GDM who are not hyperglycaemic. This means that there should be a discussion on starting insulin for patients with evidence of foetal overgrowth, even with normoglycemia.

Figure 30. Initial approach to glucose management in patients with newly diagnosed gestational diabetes mellitus at 24 to 28 weeks of gestation.



Choice of hypoglycaemic agents

The pharmacotherapy options in pregnant patients are insulin and/or oral antihyperglycemic agents. In Fiji, metformin is used in pregnancy. For dosage, begin with 500mg once daily taken with the evening meal and then increased once tolerated. Patients can have a maximum daily dose of 2500mg. The usual effective dose is 1500-2000mg/day divided into 2 or 3 doses.

Meta-analyses comparing use of oral antihyperglycemic agents with insulin therapy have generally found that both approaches can improve some pregnancy outcomes in patients with GDM or type 2 diabetes. With insulin, there is more frequent maternal hypoglycaemia, and some patients on oral agents need supplemental insulin to achieve and maintain glucose levels in the target range.

The insulin dose required to achieve target glucose levels varies among individuals, but most studies have reported a total dose ranging from 0.7 to 2 units per kg (current pregnant weight). Typically, regardless of body weight, insulin dosing is based on the glucose levels recorded in the patient's blood glucose log.

Insulin requirements across pregnancy

While glucose targets are the same throughout pregnancy, insulin requirements decrease in the first trimester so the risk for hypoglycaemia increases. This is more relevant to the overt/pre-existing diabetics. After 18 weeks of gestation, insulin requirements increase quickly until plateauing near 37 weeks. An unexpected $\geq 15\%$ decline in insulin requirements should prompt an assessment of foetal wellbeing.

Management of hypoglycaemia

It is important to review signs and symptoms of hypoglycaemia (e.g. tremor, palpitations, anxiety/arousal, sweating, hunger, dizziness, weakness, drowsiness, confusion) with the patient, as well as actions the patient (and close contacts) should take, if hypoglycaemia develops.

Hypoglycaemia in pregnancy is defined as a blood glucose < 60 mg/dL (3.3 mmol/L). Hypoglycaemia remote from meal or snack time is rare in patients with GDM treated

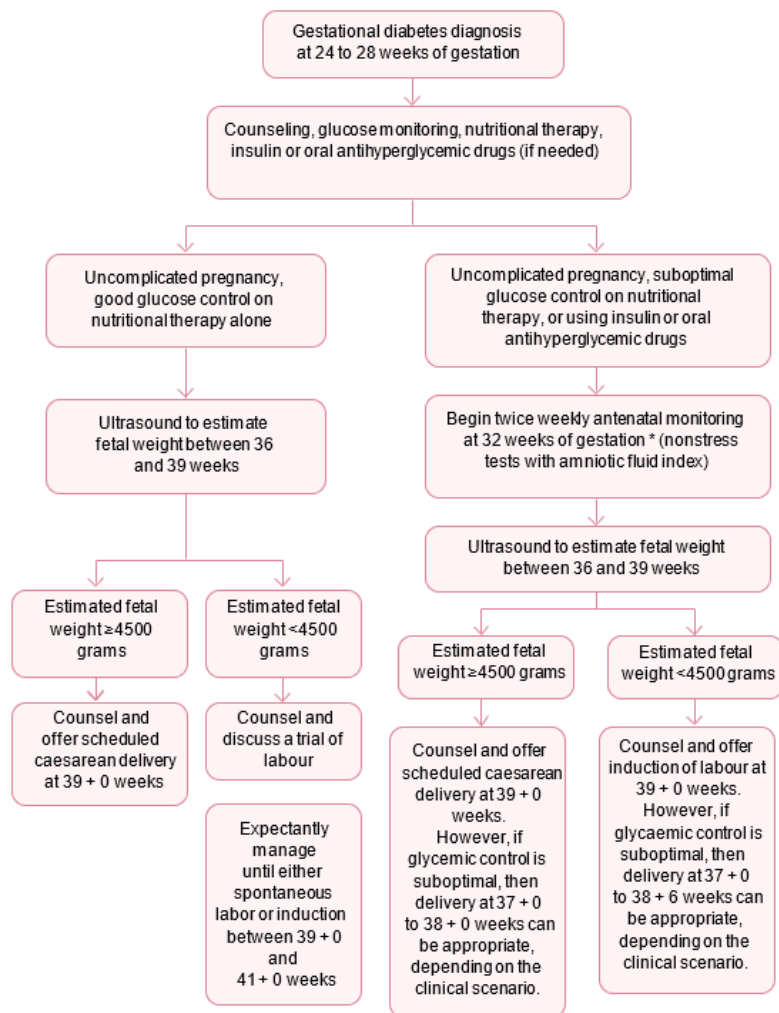
with medications.

Suggestions for management of hypoglycaemia

- 1/2 cup of juice or a sweetened drink e.g. Fanta
- 1 cup milo/cocoa with sugar, or
- 5 to 6 candies

Patients who are feeling better may recheck their blood glucose 15 to 30 minutes after treatment. Patients should be instructed to carry snacks or sweets.

Figure 31. Care of uncomplicated gestational diabetes



Foetal surveillance and timing of delivery GDM A1: well-controlled on diet therapy alone

1. These patients are not at increased risk for stillbirth.
2. Comorbidities can increase their risks e.g., obesity, hypertension.
3. Antenatal foetal testing (nonstress test, biophysical profile) in these patients is not indicated unless they have a standard obstetric indication for foetal surveillance (e.g., growth restriction).
4. Foetal kick chart can be given at term.
5. Timing of induction – offer induction of labour at 39 weeks of gestation. Avoid postdatism.

GDM A2: patients are on pharmacologic therapy, OR GDM A1 with suboptimal glucose control, OR GDM A1 with LGA or polyhydramnios

1. These patients may be at increased risk for stillbirth especially when they have comorbidities like obesity and/or hypertension.
2. Antenatal foetal surveillance – The optimal testing regimen has not been established from rigorous studies. Twice weekly antenatal testing, using a CTG with an amniotic fluid index, starting at 34 weeks of gestation is recommended, if available.
3. If the above surveillance cannot be guaranteed, consider transfer of patient by 34 weeks.
4. Foetal kick chart for the patients from 34 weeks.
5. Timing of induction – For candidates for vaginal birth, induction of labour at 39 weeks of gestation. Potential benefits include lower rates of: macrosomia and large for gestational age infants, shoulder dystocia, caesarean birth, and stillbirth.
6. If a concomitant medical condition (e.g., hypertension) is present or glycaemic control is suboptimal on pharmacologic therapy, birth should be undertaken as clinically indicated prior to 39 weeks of gestation (37 to 39 weeks recommended).

Postpartum care

- Breastfeeding – All patients should be encouraged to breastfeed. A potential benefit of breastfeeding is that it improves glucose metabolism in the short term.
- Contraception – While any type of contraception is acceptable as long as the usual medical contraindications to use are absent, long-acting reversible contraception is convenient and has minimal risk of unplanned pregnancy.

Maternal prognosis

GDM is a strong predictor of recurrence in a subsequent pregnancy. Recurrence rate can be up to 41%. **Long-term risk**

- **Impaired glucose tolerance** – Up to 30% of patients with GDM have impaired glucose tolerance during the early postpartum period.
- **Type 2 diabetes** – In a meta-analysis, patients with GDM were at an almost 10fold higher risk of developing subsequent type 2 diabetes than patients with normoglycemic patients. The lifetime maternal risk for diabetes has been estimated to be as high as 50 to 60%.
- **Type 1 diabetes** – GDM also appears to be a risk factor for the development of

type 1 diabetes, particularly in populations with a high prevalence of this disorder.

- **Metabolic syndrome** – After 3 months postpartum, patients with GDM are more likely to develop metabolic syndrome and cardiovascular disease.

Therefore, women should be advised to see their general practitioners, or nearest MCH Clinics at 1, 6 and 12 weeks postpartum for review. A repeat OGTT should be done at 6 and 12 weeks, and to be performed annually thereafter.

Overt/Pre-existing diabetes

Screening and diagnostic criteria for overt/pre-existing DM and GDM.

A diagnosis of overt diabetes is made in women with any of the following criteria at their initial prenatal visit:

- Fasting plasma glucose ≥ 126 mg/dL (≥ 7.0 mmol/L), or
- A1C $\geq 6.5\%$, or
- Random plasma glucose ≥ 200 mg/dL (≥ 11.1 mmol/L) that is subsequently confirmed by elevated fasting plasma glucose or HbA1c.

Pregestational diabetes complicates approximately 1 to 2% of all pregnancies and accounts for 13- 21% of diabetes in pregnancy, with the remainder due to gestational diabetes.

Type 1 and type 2 diabetes incur an elevated risk of adverse maternal and foetal outcomes, which includes:

1. congenital malformations
2. early pregnancy loss
3. preterm birth
4. preeclampsia
5. macrosomia, and
6. perinatal mortality.

Tight glycaemic control in the peri-conceptual period and during pregnancy is associated with improved outcomes.

Initial risk assessment

Overt diabetes should be immediately managed as diabetes in pregnancy.

- Current recommendations indicate that if overt diabetes or gestational diabetes has not been diagnosed with initial testing at the first prenatal visit, a 75 g, 2-hour oral GTT should be administered at 24 to 28 weeks of gestation to all qualified patients according to the risk assessment.
- All abnormal screening tests using capillary blood samples (CBG or capillary blood glucose testing) must be repeated with a venous blood sample before a further course of action is defined.



Caution

About 1% of women with gestational diabetes in a clinic setting are at risk of developing type 1 diabetes. Type 1 diabetes should be suspected in women who have minimal or no risk factors for GDM, present with high BGL (e.g. > 20 mmol/L), plus significant ketonuria. These women should be followed-up for at least 2 years postpartum.

Initial maternal evaluation for overt/pre-existing diabetics

Investigations – All patients

1. Routine prenatal laboratory tests and evaluation, including measurement of blood pressure and body mass index, and urine culture.
2. Glycated haemoglobin (haemoglobin A1C), which may be repeated periodically during pregnancy.
3. Serum creatinine.
4. 24-hour urine collection for protein (urinary protein-to-creatinine ratio is an acceptable alternative).
5. Dilated eye examination, which may be repeated every trimester and for one year postpartum, as indicated by degree of retinopathy and as recommended by ophthalmologist.
6. Clinical evaluation for atherosclerotic vascular disease, neuropathy, and gastroparesis

Selected patients

- Electrocardiogram (in patients with symptoms of cardiovascular disease).
- Thyroid-stimulating hormone (in patients with type 1 diabetes)

Management of overt/pre-existing diabetics in pregnancy

Glycaemic management – Meticulous attention to glycaemic control throughout gestation is essential to minimise the risk of complications. The target therapeutic levels are the same as GDM patients.

- Fasting glucose 70 to 91.8 mg/dL (3.9 to 5.1 mmol/L) and
- Two-hour postprandial glucose 100 to 120 mg/dL (5.6 to 6.7 mmol/L)

First trimester

- Nausea and vomiting – have a low threshold for treatment of nausea and vomiting of pregnancy as it facilitates insulin management and relieves maternal discomfort. Clinicians should also consider whether it may be a manifestation of

gastroparesis.

- **Maternal evaluation** – end-organ assessment
 - Folic acid (at least 400 mg orally daily) is begun prior to pregnancy or as soon as pregnancy is diagnosed for prevention of neural tube defects.
 - Aspirin 150 mg start at 12 weeks for preeclampsia prophylaxis (patients with diabetes are at increased risk for preeclampsia).
 - In patients with hypertension, we recommend a goal BP of less than 140/90 mmHg. ACE inhibitors and angiotensin II receptor blockers should be avoided.
- **Foetal evaluation**

First-trimester obstetric ultrasound is useful to confirm cardiac activity and gestational age and provide preliminary evaluation for major congenital malformations because pregestational diabetes is associated with increased risks for pregnancy loss, congenital anomalies, and preterm birth.

Second and third trimesters

- Foetal anatomic survey – detailed ultrasound examination of foetal anatomy is performed between 18 and 22 weeks of gestation.
- Preeclampsia – monitoring for preeclampsia is a routine component of antenatal care.
- Depending on local expertise, all patients with diabetes may be referred for foetal echo.
- Antepartum foetal surveillance – patients with pregestational diabetes are at increased risk of stillbirth. Twice-weekly antepartum foetal surveillance (nonstress test, biophysical profile) starts at 32 weeks of gestation.
- Assessment of foetal growth and amniotic fluid – USS at 28 to 32 weeks of gestation to assess for foetal growth and repeat the examination every four weeks.
- Antenatal corticosteroids (ACS) – If a course of antenatal corticosteroids is administered to patients at high risk for preterm birth, blood glucose concentrations are checked frequently and hyperglycaemia, which may become severe, is managed with increased insulin. Routine ACS is not recommended.
- Tocolysis – preference for tocolytic therapy is nifedipine. Avoid beta-adrenergic receptor (Salbutamol) agonists as they can cause severe hyperglycaemia in patients with diabetes.
- Routine MSU at every trimester for these patients

Delivery

- For patients with well-controlled hyperglycaemia and without vascular complications or macrosomia, we suggest induction at 39 to 39+6 weeks of gestation.
- For patients with uncontrolled hyperglycaemia, vascular complications, or history of stillbirth and without macrosomia, we suggest induction at 36 to 38 weeks + 6 days. The timing of birth within this range depends on patient-specific and facility-specific factors.
- For patients with estimated foetal weight (EFW) > 4.5kg, an elective caesarean section is needed.

Intra-partum care

- Strict control of maternal glycemia during labour and delivery is commonly recommended to optimise foetal outcomes.
- Attention to intrapartum glycaemic control is based on evidence that it reduces the risk of two major complications: foetal hypoxemia and neonatal hypoglycaemia.
- Target range for intrapartum glucose levels is 70 to 125 mg/dL (3.9 to 6.9 mmol/L).

These levels may be relaxed after birth:

» <140 mg/dL [7.8 mmol/L] pre-prandial glucose » <180 mg/dL [10.0 mmol/L] any random glucose.

Type 1 diabetes

- Patients on multiple daily injections.
- In early labour, if food is not restricted, the patient on multiple daily insulin injections follows their usual subcutaneous insulin regimen, including basal, prandial, and correctional coverage.
- Once food is restricted and/or the active phase is reached, an intravenous insulin infusion is started using a standardised protocol. Dextrose-containing intravenous fluids are administered along with the insulin infusion as long as the patient is not hyperglycaemic (i.e., administer if blood glucose <160 mg/dL [8.9 mmol/L]).
- Provide an initial postpartum insulin that is 30 to 35 percent of the insulin dosages prior to delivery. Postpartum insulin requirements vary widely; close monitoring and adjustment are needed.
- Target blood glucose levels are 70 to 125 mg/dL (3.9 to 6.9 mmol/L) during active labour. Higher blood glucose levels have been associated with foetal acidemia and neonatal hypoglycaemia.

Type 2 diabetes

- In early labour, if food is not restricted, the patient on multiple daily insulin injections takes 70 to 80 percent of the antenatal total daily insulin dose.
- After food restriction and/or in the active phase of labour, either an intravenous insulin infusion or correctional insulin administered via a sliding scale every two to four hours is acceptable.
- Dextrose-containing fluids are infused if the patient is not hyperglycaemic. If the patient is very or persistently hyperglycaemic (glucose >200 mg/dL [11.1 mmol/L] upon arrival to labour ward, or RBS >125 mg/dL [6.9 mmol/L], more than once, intravenous insulin infusion should be started.
- Patients on metformin should not take this medication during labour.
- Postpartum – Most patients with type 2 diabetes should be treated with metformin. Those who were on long-standing insulin before pregnancy should follow a similar management plan as for type 1 diabetes, with the addition of metformin. Breastfeeding may have metabolic benefits and should be encouraged, but options for agents to treat hyperglycaemia in breastfeeding patients are limited to metformin and insulin.

Gestational diabetes

During labour, patients with gestational diabetes can often be managed with subcutaneous sliding scale insulin. If blood glucose levels are persistently above the goal of 125 mg/dL (6.9 mmol/L) despite subcutaneous insulin, insulin infusion can be initiated.

Other intrapartum issues

- Strict monitoring and interpretation of the Partogram
- Early referral for LGAs, labour dystocia
- Team should practice shoulder dystocia drills/simulations.
- Avoid assisted vaginal deliveries for LGAs/labour dystocia patients.
- Watch out for early signs of labour and shoulder dystocia.

Postpartum

- Glycaemic management – Insulin requirements drop sharply after delivery and are transiently lower than requirements prior to pregnancy.
- Breastfeeding – Patients with diabetes are encouraged to breastfeed. Insulin and metformin are compatible with breastfeeding.
- Postpartum depression – Clinicians should screen for postpartum depression, which appears to be more common in patients with diabetes.
- Surveillance for retinopathy – Eye examinations are continued for one year postpartum, as indicated by the degree of retinopathy.
- Refer to Diabetic Hub or nearest SOPD for continuity of care.

Contraception

Consider all hormonal methods acceptable for patients with diabetes and no vascular disease, but depot medroxyprogesterone (Depo-Provera) may raise glucose levels so close monitoring is required.

In patients with vascular disease, combined hormonal contraceptives and depot medroxyprogesterone are avoided.

Risk counselling at high-risk clinic

Risk counselling must be done at booking or at high-risk clinic at the time of diagnosis. This involves discussion of potential foetal, neonatal, obstetric, and maternal adverse outcomes. These are some of the issues that must be covered during these counselling sessions. You will need to decide which information is relevant to your patient and may take several encounters to share all that is necessary in the language that is best for your patient and her family.

Risks with type 1 versus type 2 diabetes – Pregnancy outcomes are generally similar for patients with type 1 versus type 2 diabetes, but there are some important differences in risk of maternal complications.

- Type 1 diabetics are more likely to have pregestational microvascular complications that can worsen during pregnancy.

- Type 1s are also at higher risk of developing severe hypoglycaemia and diabetic ketoacidosis
- Microvascular complications also increase the risk for IUGR/SGAs.

A. Foetal and neonatal risks – The risk of these complications is directly related to glycaemic control throughout pregnancy.

1. Congenital malformations - overall risk is 2 to 4-fold higher than those without diabetes and this is strongly related to the degree of hyperglycaemia in the periconceptional period. This can affect any organ system, but most common abnormality is congenital heart disease, CNS and urogenital anomalies.
2. Preterm birth - significantly higher risk of both medically and obstetrically indicated preterm birth and spontaneous preterm birth compared with those without diabetes.
3. Large for gestational age/macrosomia - Accelerated foetal growth is common in pregnancies complicated by pregestational diabetes. Macrosomia is of concern because macrosomic foetuses are at increased risk of shoulder dystocia and birth trauma (e.g., brachial plexus injury, fracture) if delivered vaginally. Glucose control, starting from the periconception period and throughout pregnancy, appears to have an impact on the risk of LGA/ macrosomia. Birth weight is also affected by glycaemic variability, gestational weight gain, pre-pregnancy obesity, and maternal lipid levels.
4. Growth restriction - The risk is higher in pregnant patients with type 1 diabetes and is related to presence of diabetic vasculopathy, particularly when severe. FGR/SGA is significant because it is associated with increased foetal/neonatal mortality and short- and long-term morbidity.
5. Other neonatal morbidity - Neonatal medical complications associated with maternal pregestational diabetes include hypoglycaemia, erythrocytosis, hyperbilirubinemia, hypocalcaemia, respiratory distress, and cardiomyopathy.
6. Perinatal mortality - Perinatal mortality is increased in pregnancies complicated by pregestational diabetes, and the risk begins to increase at A1C levels between 6 and 6.9 percent.
7. Long-term outcomes - Maternal diabetes has potential long-term impact. Offspring of mothers with diabetes are at increased risk of developing diabetes, obesity, and other adverse cardiometabolic outcomes.

B. Obstetric complications

1. Early pregnancy loss - Rates of early pregnancy loss are two- to threefold higher.
2. Preeclampsia and gestational hypertension - The risks of both preeclampsia and gestational hypertension are three- to fourfold higher in pregnant people with pregestational diabetes. Evidence suggests that good glycaemic control and use of low-dose aspirin during pregnancy decreases

this risk

3. Polyhydramnios
4. Caesarean birth
5. Surgical site Infection.

C. Maternal medical risks

1. Hypoglycaemia
2. Progression of microvascular disease – The likelihood of worsening microvascular complications in pregnancy is related to duration of diabetes and pre-pregnancy glycaemic control
3. Diabetic retinopathy – Those with proliferative retinopathy (marked by new retinal vessel growth), may worsen during pregnancy because of often rapid strengthening of glycaemic control and pregnancy-related hormonal changes.
4. Diabetic kidney disease
5. Cardiovascular disease – Pregnant people with pregestational diabetes are at increased risk of macrovascular cardiac disease (e.g., coronary artery disease, heart failure, stroke) and microvascular cardiac disease (e.g., microvascular angiopathy, cardiac autonomic neuropathy)
6. Diabetic ketoacidosis – Diabetic ketoacidosis is more common in type 1 and may be fatal and carries a substantial risk of foetal demise. In addition to the usual triggers of diabetic ketoacidosis, potential pregnancy-related causes include treatment with beta-mimetic tocolytics and antenatal corticosteroids.

Preconception

The key components of preconception diabetes management are:

- glycaemic control - primary preconception A1C goal for all patients is A1C < 6.5%
- proficient diabetes self-care, and
- medical optimisation of pre-existing complications and comorbidities associated with diabetes.

Diet, weight, and exercise - Diet is one of the most important behavioural aspects of diabetes treatment. Patients who are overweight or have obesity should be encouraged to lose weight prior to conception.

Folic acid supplementation - recommendation for supplemental folic acid 400 micrograms/day

Contraception - Contraception is recommended for all women until glycaemic control is achieved, management of complications or comorbidities is optimised, and pregnancy is desired.

Comprehensive and ongoing patient education is critical for shared decision-making about management goals to help patients meet the considerable demands of preconception and antenatal care.

Preconception counselling - The intense medical and lifestyle regimens that must be undertaken before and during pregnancy and the worry over pregnancy outcome can

have an impact on the patient's and partner's mental health. In the unfortunate case of prior foetal loss or congenital malformation, patients may also experience grief, guilt, and post-partum depression. For this reason, it is important that preconception counselling, evaluation, management, and antenatal care be conducted with a patient-centred approach to help the mother have a positive pregnancy experience

11.0 Diabetes and COVID-19

The COVID-19 pandemic began in Wuhan China in late 2019. The SARS COV 2 virus had swept through the world and has caused multiple waves of infections. The risk of severe illness, manifested as the need for hospitalisation, intubation, and death, can occur in otherwise healthy individuals of any age. The risk of severe illness is most pronounced in adults with advanced age or underlying medical comorbidities, including diabetes. The risk of HHS and DKA is also pronounced in patients with COVID.

Patients with type 2 diabetes are more likely to have serious complications, severe disease and death (Targher G, 2020). Mortality risk is much higher in patients who have had poorly controlled diabetes mellitus; in diabetes type 1 mortality is higher if HbA1c is higher than 10 as compared to 6.5 to 7. In diabetes type 2 mortality is higher with HbA1c 7.6 to 8.9 as compared to 6.5 to 7 (Holman N, 2020).

Specific management pointers

Outpatient management

In an ambulatory patient who can tolerate oral intake can continue their usual medications. Patients with type 1 should continue their usual insulin dose. These patients should be reviewed if required and have a clear clinical pathway outlined should their condition deteriorate. There is availability of oral antiviral

Inpatient management

Management of COVID 19 admitted patients is similar to patients with sepsis. If patient is admitted for severe COVID 19, oral and non-insulin medications are stopped, and insulin is started. For HHS and DKA same protocols are followed as sepsis. Please refer to guideline section.

In severe COVID 19 it can be noted that some patients will have severe insulin resistance, as such their requirements may increase drastically. This is observed in severe infections only. As the patient improves, the insulin requirements also decrease. (Ren H, 2020)

There is availability of IV interleukin-6 inhibitor.

For further management please refer to clinical management for COVID-19.

12.0 Diabetics and disasters

Diabetes mellitus affects people of all ages, ethnicity, education and socioeconomic status in cities, rural, and remote regions of every country. Approximately one-third of the world's estimated 483 million people with diabetes live in the most populous of the seven International Diabetes Federation (IDF) regions, the Western Pacific Region (WPR). An estimated 10% of people aged 20–79 years, i.e., 163 million adults and more than 102,000 children and adolescents have diabetes, with related substantial personal and socioeconomic costs. (IDF-WPR:2022)

After a disaster event, it is well known that chronic illnesses such as diabetes and its complications worsen due to enduring stress and lack of medications. A disaster can be defined as a serious disruption to community life which threatens or causes death or injury and or property damage beyond the day-to-day capacity. E.g. of natural disasters include earthquakes, landslides, floods, cyclones, storms, tsunamis, fires, volcanic eruptions, droughts, epidemics or pandemic infections.

People with health conditions such as diabetes, are also particularly vulnerable during disaster. Better disaster management to which preparedness at multiple levels is key.

Multiple stakeholders should be actively involved in disaster management. This includes the person with diabetes, their families, neighbours and local community, DISMAC, govt ministries, NGO, Red Cross etc.

Disaster preparedness plan:

- Know your medical diagnosis, including diabetes and how a disaster might affect them.
- Have a list of your regular healthcare providers and their contact information.
 - a. Provincial Administrator office, NDMO
 - b. Local District Nurse, Team Leader, Nursing Manager, Medical Officer, SDMO
 - c. Red Cross for clothing and shelter
 - d. Medical Services Pacific – women's sanitary packs
 - e. Rations- FCOSS, religious bodies
 - f. Counselling support (Psychosocial First Aid) – call 5626 Empower Pacific
 - g. Diabetes Fiji
 - h. Diabetes Fiji and Hub – telehealth, diabetes management, consumables support for type 1
- Have copies of prescriptions or printouts from your pharmacy listing your medications and information on how to care for them.
- Know basic self-care skills.
- Learn about stress management skills.
- Check feet daily for open sores/cuts/bruises.
- Wear protective footwear.
- Pack your emergency snack/lollies in case of hypo and non-perishable foods that are considered low GI such as whole biscuits.
- Know about food safety principles.
- Know about 'sick day' rules.

- Know about low and high blood sugar treatments.
- Wear medical alert emergency identification (type 1 bracelet)
- Assemble a disaster supply kit – review the kit every 2–3 months to be sure supplies have not expired (see below for suggested kit contents)
- Know about general emergency principles and basic safety information.
- Be sure you have developed a plan with your family/caregivers about where to meet after a disaster.
- Be aware of surroundings and watch for hazards from the debris that often accompanies a disaster.
- Know about the location of shelters and possible medical care options.
- Know the names of your medications.
- Pack non-perishable foods such as whole meal biscuits.
- Store adequate water and also water purification pills.
- Update your clinic card – medications, allergies, any complications and wound dressing.
- Pack medical card with machine in a plastic or zip lock bag.
- Village leaders/VHW must have registration for all living with DM to assist in registration at evacuation centre.

Examples of items for an emergency kit for people with diabetes

- Two-week supply, although some groups recommend a 30-day supply.
- Alcohol swabs and blood glucose monitoring supplies (meter to measure blood sugar, strips to use with meter or strips for visual reading, lancets and lancet device, blood sugar testing diary).
- Sharps container to safely dispose of needles and other sharps.
- Parental consent forms to treat in an emergency.
- Medications taken regularly.
For those who take insulin: supplies such as syringes, insulin pen and pen needles, and, if appropriate, insulin pump supplies, snack/ hard candies (lollies) in case of hypoglycaemia
- Flashlights and proper footwear.

During disasters

1. Stay calm and be positive.
2. Adhere to usual medications and recommended diet.
3. Regularly monitor your blood glucose
4. Avoid unhealthy foods in evacuation centres
5. Do not take risks going out which can cause injuries, especially to your feet.
6. Protect your feet with socks and proper footwear.
7. Store insulin in an ice cream container or sealed container and bury the container in the soil in case of a power outage.
8. Continue to be physically active by doing sitting exercises, and in-house cardio exercises.
9. Wear a diabetic alert bracelet especially for type 1 DM.
10. Avoid physical contact during lockdown or isolation and wear appropriate PPE.
11. Properly manage your ration and fluids to prepare also for the recovery period.
12. Call the helpline in case of emergency.

13. Call the helpline in cases you run out of medication.
14. People registering at the evacuation centre must include medical conditions such as diabetes.

Disaster recovery and rehabilitation

1. Ensure you are on the recommended diet
2. Adhere to your medications, if necessary, replenish if possible
3. Continue Physical Activity
4. Seek medical advice if developing fever, High blood pressure, and other health conditions and injuries
5. Visit nearest health facilities for health check (glucose, ketone, blood pressure)
6. Seek Psychosocial First Aid (PFA) support

Man-made and natural disasters pose special challenges for people with diabetes. The disruption of healthcare delivery systems can have both short- and long-term health impacts. Disaster training programmes should educate people with diabetes and their caregivers, emergency personnel, and other healthcare professionals about disaster prevention, mitigation and recovery. Early planning can prevent later disaster-related exacerbations of diabetes.

13.0 Common skin problem in diabetes

DISEASE	APPEARANCE	COMMON SITES	SYMPTOMS
Acanthosis Nigricans	Multiple poorly demarcated plaques with grey to dark-brown hyperpigmentation, and a thickened velvety to verrucous texture	Back of the neck, axilla, elbows, palmer hands, inframammary creases, umbilicus, groin	Typically, asymptomatic 
Diabetic dermopathy	Rounded, dull, red papules that progressively evolve over one-to-two weeks into well-circumscribed, atrophic, brown macules with a fine scale; lesions present in different stages of evolution at the same time	Pretibial area, lateral meoli, thighs	Typically, asymptomatic 
Diabetic Foot Syndrome	Chronic ulcers, secondary infection, diabetic neuro-osteoarthropathy, clawing deformity	Feet	Typically, asymptomatic but may have abnormal gait 
Scleroderma-like skin changes	Slowly developing painless, indurated, occasionally waxy appearing, thickened skin	Acral areas: dorsum of the fingers, proximal interphalangeal areas, metacarpophalangeal joints	Typically, asymptomatic but may have reduced range of motion 

DISEASE	APPEARANCE	COMMON SITES	SYMPTOMS
Ichthyosiform skin changes	Large bilateral areas of dryness and scaling (may be described as "fish scale" skin)	Anterior shins, hands, feet	Typically, asymptomatic 
Xerosis	Abnormally dry skin that may also present with scaling or fissures	Most common on the feet	Typically, asymptomatic 
Pruritus	Normal or excoriated skin	Often localised to the scalp, ankles, feet, trunk, or genitalia; however, it may be generalised	Pruritus 

TREATMENT PLAN

Skin condition	General measure	Specific measure (Pharmacological treatment)				
	(Non-pharmacological treatment)	Routes of drug administration	Drug	Dose	Duration	Notes
Acanthosis Nigricans	Improved glycaemic control, Lifestyle modifications such as a establishing a healthy diet, increasing exercise to help attenuate insulin resistance and hyperinsulinemia.	Topical use	Salicylic acid	1–2%	4–6 weeks	**If there is no improvement after 8 weeks of treatment, refer to specialist dermatologist
			*Topical retinoids: adapalene, isotretinoin, tretinoin, trifarotene cream	0.1% adapalene gel 0.025% tretinoin cream 0.005% <i>calcipotriol</i>	6–8 weeks 3 months of application twice daily	
		Oral	*Retinoids (isotretinoin and acitretin)	3 mg/kg/day	Initial 2 months, then tapering this dose over more than a year	
Diabetic dermopathy	It is self-resolving, need to improve glycaemic control					
Diabetic foot syndrome	Improved glycaemic control, ***Interdisciplinary team-based approach involving daily surveillance, appropriate foot hygiene, proper footwear/walker, wound care, antibiotics, wound debridement, surgery					

Continued next page...

Continued from previous page.

Scleroderma-like skin changes	Improved glycaemic control, physical therapy					**If there is no improvement after 8 weeks of treatment, refer to specialist dermatologist for Phototherapy
Ichthyosiform Skin Changes	Improved glycaemic control, Lifestyle modifications such as establishing healthy diet	Topical use	*Emollients e.g. pure Fiji emollient lotion, Coconut oil, Aveeno emollient lotion etc. No side effects of emollients reported Keratolytic: *Urea, Salicylic acid	Urea cream – 4–10% Salicylic acid – 1–2%	3 to 6 months 4–6 weeks	**If there is no improvement after 8 weeks of treatment, refer to specialist dermatologist
Xerosis	Improved glycemic control	Topical use	*Emollients e.g. pure Fiji emollient lotion, Coconut oil, Aveeno emollient lotion etc. No side effects of emollients reported		3 – 6 months	**If there is no improvement after 8 - 12 weeks of treatment, refer to specialist dermatologist
Pruritus	Improved glycaemic control, lifestyle modifications such as establishing healthy diet	Topical use	*Topical capsaicin	0.025% cream Amitriptyline HCl 2%, Ketamine HCl 1%, and Lidocaine HCl 5% in PLO Gel/cream	2 – 4 weeks 2 – 4 weeks	**If there is no improvement after 8 - 12 weeks of treatment, refer to specialist dermatologist
		Oral	Antipruritics, corticosteroids.	5–10 mg/day 5–40 mg/day	3–7 days 3–7 days	

* Not available in EML

** Refer to secondary care facility (Tamavua Twomey Hospital)

*** Interdisciplinary team to plan the treatment options. PEN MODEL IN DIABETES Refer to PEN CRAM Guideline 2023

14.0 Diabetes and oral health

The mouth or oral cavity is also prone to complications associated with diabetes. Persons with diabetes are more likely to develop gum disease and other oral health-related complications. The most recognised oral health complication related to diabetes are gingivitis (gum disease) and periodontitis (advanced gum disease) also referred to as periodontal disease. Healthy teeth and gums are important for people with diabetes as good oral health helps them in managing their diabetic condition.

Periodontal disease and diabetes

Periodontal disease is an infection of the gingiva (gums) and the supporting structures of teeth due to poor oral hygiene that leads to a build-up of plaque and calculus. Symptoms of periodontal disease include bad breath (halitosis), bleeding and swollen gums, and loose or mobile teeth.

Periodontal disease and diabetes have a two-way or bidirectional relationship which means that high glycaemic levels can exacerbate the effects of periodontitis, while untreated periodontitis can affect a person's glycaemic control. Literature has strongly indicated an increased link between periodontitis and a higher risk of complications for diabetic patients.

It is important to note that smoking and diabetes are considered risk factors for periodontitis. Evidence suggests that these two risk factors may have a synergistic effect on the oral cavity's normal flora, the inflammatory response, and a person's periodontal status.

Uncontrolled diabetes increases a person's risk of the following oral health complications:

- Dental caries (tooth decay) and tooth loss
- Salivary gland dysfunction that leads to a decrease in saliva production causing mucosal discomfort, oral soft and hard tissue disease to significant functional disturbances
- Oral fungal and bacterial infection secondary to immune-compromised state
- Delayed or poor healing of wounds in the mouth, such as mouth ulcers, an extraction socket, or gingival diseases.
- Altered taste
- Oral dysesthesia or burning mouth syndrome (BMS) is a painful condition affecting the oral cavity (palate, tongue, throat, and gingivae).
- Gum swelling and abscess.

Diabetic patients presenting with one or more of the signs and symptoms listed above should be referred to their nearest dental clinic for further care.

Newly diagnosed diabetic patients *should* be referred to the nearest dental clinic for oral health screening, care, and advice.

Important oral health-related questions you should routinely ask:

1. Was your last oral health check-up more than six months ago?
2. Was your last scaling (teeth cleaning) appointment more than six months ago?
3. Have you experienced loose teeth, red or swollen gums, pain or burning sensations, difficulty chewing, or poorly fitting dentures within the past six months?

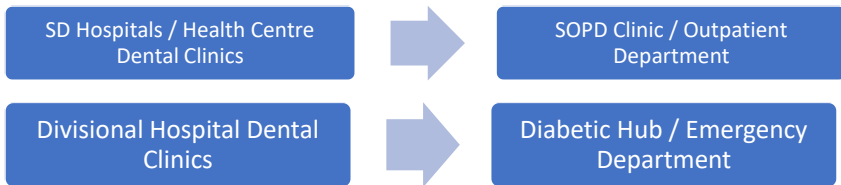
If your patient has answered 'Yes' at least twice to the three questions above, they should be referred to their nearest dental clinic for further care.

Referral pathway:

1. From the dental clinic:

Undiagnosed patients with uncontrolled glycemic control.

Acute Management:

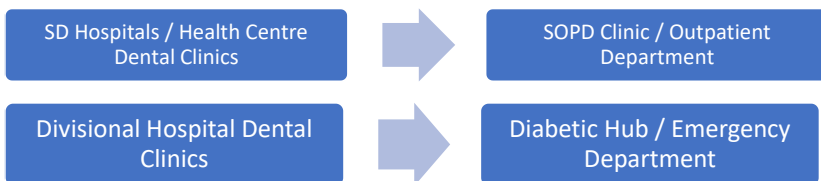


For workup and diagnosis of uncontrolled glycemic levels:



Diagnosed patients with uncontrolled glycemic control:

Acute Management:



For further management of their uncontrolled glycemic levels:



2. From SOPD or Diabetic Hub:



Dental review schedule for diabetic patients:

Once diabetic patients have had their initial oral health screening in the dental clinic, those who require treatment are put on a treatment plan while those who have sound oral hygiene are reviewed every six months regardless of the state of their diabetic condition.

The treatment plan and/or dental review schedule for patients requiring treatment is dependent on the **severity of the disease**, in particular gingivitis, periodontitis, and/or other predisposing oral health factors that can increase the risk of the patient to gum disease. The review schedule will range from monthly, three monthly, or six-monthly appointments again regardless of their diabetic condition.

However, diabetic patients may be referred to the dental clinic at any time, during their routine SOPD or Diabetic Hub Clinics, should they exhibit any signs or symptoms of deteriorating oral hygiene.

Severity of periodontal disease	Review schedule
Advanced	Monthly after the initial phase of Stabilisation (scaling and debridement)
Moderate	3 monthly
Low	6 monthly

Dental treatment considerations for diabetic patients:

- Elective dental and oral facial procedures should be postponed if glycaemic control is poor.
- Oral examinations and conservative management in the dental clinic do not require a written medical clearance.*
- However, for invasive procedures under local anaesthetic, the dental team will require a written medical clearance from a Medical Officer or Nursing Practitioner for any patient being referred to the dental clinic.
- Early morning appointments are encouraged whenever possible.
- An undiagnosed diabetic patient with a glycaemic reading of >10 mmol/L needs thorough medical reviewing and then a written clearance.
- A known diabetic patient with a glycaemic reading of >10 mmol/L needs written clearance.
- For the management of hypoglycaemic shock or insulin inactivity in the dental setting, the dental practitioner should refer to their current guideline on medical emergencies and its management in the dental clinic.

*** Important information to note when providing a medical clearance for dental treatment:**

- The patient is medically fit and their most recent blood sugar reading.
 - ✓ For all invasive dental procedures, readings between 4 mmol/L and 10 mmol/L are acceptable. Readings below 4mmol/L or above 10mmol/L will require a case-by-case decision on whether to proceed with the desired dental treatment or not.
- The need for antibiotic use post-treatment may be discussed on a case-by-case basis if needed.
- Other existing comorbidities.
- In the setting of Orofacial sepsis, source control, and antibiotics needed.
- Dietary considerations post-treatment, especially for extensive dental therapy where eating patterns may be affected.
- Required changes in the patient's diabetic medication regimen.

Basic oral hygiene advice for diabetic patients

- Check your mouth for red or swollen gums, bleeding gums, loose teeth, a change in how your bite feels, or bad breath.
- Gently brush your teeth at least two times a day.
- Use fluoridated toothpaste and a soft-bristled toothbrush.
- Gently clean between your teeth using floss or an inter-dental brush at least three times a week.
- If you are a denture wearer, clean your dentures daily, remove them at night, and store them in water.
- Have an oral health screening done at least twice a year or as advised by your dental practitioner.
- Provide smoking cessation whenever indicated.

15.0 The role of care givers

Caring for a loved one living with diabetes

- 1) Making lifestyle changes together.
 - a) Provide emotional support.
 - i) Listening – your loved one may be worried. Provide reassurance that diabetes is fully manageable and will not prevent them from living a long full of life
 - ii) Educate yourself about the conditions
 - iii) Offering little help. Accompany them to the clinic.
 - b) Make dietary changes together. Your loved one may be told to eat a healthier diet. You can both change your eating habits together. This will reduce the amount of unhealthy food you have and lessen the feeling of isolation.
 - c) Start an exercise plan together. Exercising is more fun if you have a partner to do it with and it is a great way to control blood glucose, lose weight and reduce stress. Consult physio on an exercise plan.
 - d) Help your loved one manage stress. Stress can alter how the body responds to insulin. This means that it is important for your loved one to learn to manage stress.
 - i) Learn relaxation techniques, such as breathing exercises, yoga, praying and praising
 - ii) Exercising, including gardening
 - iii) Treat yourself by taking vacations
 - iv) Getting enough sleep. Eight hours of sleep a day.
- 2) Helping your loved one managed Diabetes
 - a) Recognise symptoms of low blood glucose. This occurs if a loved one eats too little or injects too much insulin. Correct it by snacking or drinking juice. Symptoms include.
 - i) Dizziness
 - ii) Sleepiness
 - iii) Bad mood
 - iv) Agitation
 - v) Shaking
 - vi) Sweating
 - vii) Headaches
 - viii) Hunger
 - ix) Confusions
 - x) Altered behaviours
 - xi) Seizure
 - xii) Unconsciousness.
 - b) Identify the symptoms of high blood sugar. High blood sugar can occur when a loved one eats more than usual, forget to take insulin or is sick. Symptoms include.
 - i) Nausea
 - ii) Blurry vision
 - iii) Thirst resulting in frequent drinking
 - iv) Exhaustion
 - v) Dry mouth
 - vi) Frequent urination

- vii) Yeast infection.
- c) Worked with loved one's health personnel. This includes physicians, physiotherapists, nutritionists, and foot care nurses.
 - i) Listen to the doctor and take notes
 - ii) Ask if anything is unclear
 - iii) Provide doctors with additional information when necessary.
 - iv) Check your loved one's health status
 - v) Advocate for your loved ones to have complete checks such as eye, feet, kidney functions test, lipid (cholesterol) test, and HbA1c
 - vi) Learn from footcare nurses how to manage your loved one's wounds
 - vii) Check your loved one's feet (remember your loved one due develop poor vision therefore your inspection is important) and medications
 - viii) Know your loved one medication in case of emergency when the helpline is set up.
- d) Learn to give insulin, if necessary, you can learn this from a nurse educator.
- e) Take care of yourself as a caregiver. Being a caregiver can be frustrating, exhausting and stressful. This is critical both for your own health and wellbeing so that you can continue to be an effective caregiver.
 - i) Seeking a counsellor
 - ii) Maintain your hobbies
 - iii) Talking to friends and family
 - iv) Join the support group if available.

16.0 Available services and support for diabetes care

1. **Diabetes Fiji Inc** – Provides support for community screening, awareness and peer-to-peer counselling. It also provides consumables for health facilities that need support for screening. It coordinates support groups for people living with type 1 diabetes, and provides assistance such as glucometers, strips and syringes for underprivileged type 1 diabetics. Diabetes Fiji also facilitates training and health camps for people with diabetes and for those caring for diabetics. Support training is provided for health care providers in diabetes management with special emphasis on foot care. Contact: 3300800. Mobile: 7721513. Email: diabetesfiji@gmail.com
2. **Empower Pacific** – Provides toll-free psychosocial counselling and support for people with diabetes and their loved ones. Contact: 5626 counselling helpline. Office: 7769224. Email: headoffice@empowerpacific.com
3. **Pacific Eye Institute** – Provides eye checks and diabetes retinopathy treatment in the clinic and conducts diabetes retinopathy mobile screening in communities. Contact: 3215300. Email: jitikomailepanoni@pei.org.fj; and kprasad@pei.org.fj;
4. **Project Heaven** – Provides support for community outreach in eye and ear: projectheavenfiji@gmail.com

17.0 References

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7310804/>
2. <https://www.uptodate.com/contents/type-2-diabetes-mellitus-prevalence-and-risk-factors>
3. <https://www.sciencedirect.com/science/article/abs/pii/B9780128148334000046>
4. <https://academic.oup.com/ptj/article/88/11/1254/2858146>
5. <https://diabetesatlas.org/>
6. <https://www.who.int/news-room/fact-sheets/detail/diabetes>
7. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10364581/#:~:text=According%20to%20estimates%20from%20the,with%20the%20disease%20in%202019>
8. The Royal Australian College of General Practitioners. Management of type 2 diabetes: A handbook for general practice. East Melbourne, Vic: RACGP, 2020.
9. Abbas, Z, B. A. (2022). Diabetic foot ulcer disease in African Continent - Review of diabetic foot in last 60 years -1960 to 2020. *Diabetic Research and Clinical Practise*.
10. Amogne W., R. A. (2011). A Diabetic Foot disease in Ethiopian patients: a hospital based study. *Ethiopian Journal of Health Department*, 25 (1): 17-21.
11. Boulton AJ, A. D. (2008). Comprehensive foot examination and risk assessment: a report of the task force of the foot care interest group of the American Diabetes Association, with endorsement by the American Association of Clinical Endocrinologists. *Diabetes Care*. . *Diabetes Care*.
12. Brocklehurst, J. D. (2023). The Validity and Reliability of SINBAD ClassificationSystem for Diabetic Foot Ulcers. *Pubmed*.
13. Hoffstand O, M. N. (2015). Diabetes lower-extremity amputation and diabetes. *Diabetes Care*, 38: 1852-1857.
14. Marta Wysocka-Mincewicz, E. S. (2023). Foot Plantar Pressure Abnormalities in Near Adulthood Patients with Type 1 Diabetes. *Biomechanics*, 11, 2901.
15. Sidawy AN, P. B. (2019). *Rutherford's vascular and endovascular therapy*. Philadelphia: Elsevier.
16. T.Schmeltzpfenning, T. B. (n.d.). Foot biomechanics and gait. In *Handbook of Foot Design and Manufacturer*.
17. Zhang P, L. J. (2017). Global epidemiology of diabetic foot ulceration: A systematic review and meta-analysis. *Annals of Medicine*, 49: 106-116.
18. Anderson, J. W., Randles, K. M., Kendall, C. W., & Jenkins, D. J. (2004). Carbohydrate and fiber recommendations for individuals with diabetes: A quantitative assessment and meta-analysis of the evidence. *Journal of the American College of Nutrition*.
19. American Diabetes Association. (2021). Carbohydrate Counting.
20. Diabetes Care. (2019). Nutrition Therapy for Adults with Diabetes or Prediabetes: A Consensus Report.
21. Evert, A. B., Boucher, J. L., Cypress, M., Dunbar, S. A., Franz, M. J., Mayer-Davis, E. J., ... & Yancy Jr, W. S. (2019). Nutrition therapy recommendations for the management of adults with diabetes. *Diabetes Care*.
22. Harvard T.H. Chan School of Public Health. (2020). The Best Diet for Diabetes and Heart Health.
23. Reference - <https://mysteadyshot.com/pages/injection-sites>

24. Thomas MC, Brownlee M, Susztak K et al. Diabetic Kidney Disease. *Nature Reviews Disease Primers* 2015; 1:1-19
25. Krishnan A, Chandra Y, Malani J et al. End-stage kidney disease in Fiji. *Internal Medicine Journal* 2019; 49: 461-66
26. Komenda P, Ferguson TW, Macdonald K et al. Cost-effectiveness of primary screening for CKD: A systematic review. *Am J Kidney Dis.* 63(5):789-797
27. World Health Organisation, Guideline for the pharmacological treatment of hypertension in adults 2021; License: CC BY-NC-SA 3.0 IGO
28. KDIGO 2021 Clinical practice guideline for the management of blood pressure in chronic kidney disease. *Kidney International* 2021; 99(3): S1-87
29. KDIGO 2022 Clinical practice guideline for diabetes management in chronic kidney disease. *Kidney International* 2022 Nov;102(5S):S1-S127
30. Gregg PL, Hedeyati SS. Management of traditional cardiovascular risk factors in CKD: What are the data? *Am J Kidney Disease* 2018; 72(5):728-744
31. Ikizler TA, Burrowes JD, Byham-Gray LD et al. KDOQI clinical practice guidelines for nutrition in CKD: 2020 update. *Am J Kidney Dis* 2020; 76(3):S1-107
32. Abbas. Z, B. A. (2022). Diabetic foot ulcer disease in African Continent - Review of diabetic foot in last 60 years -1960 to 2020. *Diabetic Research and Clinical Practise.*
33. Amogne W., R. A. (2011). A Diabetic Foot disease in Ethiopian patients: a hospital based study. *Ethopian Journal of Health Department*, 25 (1): 17-21.
34. Boulton AJ, A. D. (2008). Comprehensive foot examination and risk assessment: a report of the task force of the foot care interest group of the American Diabetes Association, with endorsement by the American Association of Clinical Endocrinologists. *Diabetes Care.* . *Diabetes Care.*
35. Brocklehurst, J. D. (2023). The Validity and Reliability of SINBAD ClassificationSystem for Diabetic Foot Ulcers. *Pubmed.*
36. Hoffstand O, M. N. (2015). Diabetes lower-extremity amputation and diabetes. *Diabetes Care*, 38: 1852-1857.
37. Marta Wysocka-Mincewicz, E. S. (2023). Foot Plantar Pressure Abnormalities in Near Adulthood Patients with Type 1 Diabetes. *Biomechanics*, 11, 2901.
38. Sidawy AN, P. B. (2019). *Rutherford's vascular and endovascular therapy.* Philidelphia: Elsevier.
39. T.Schmeltzpfenning, T. B. (n.d.). Foot biomechanics and gait. In *Handbook of Foot Design and Manufacturer.*
40. Zhang P, L. J. (2017). Global epidemiology of diabetic foot ulceration: A systematic review and meta-analysis. *Annals of Medicine*, 49: 106-116.
41. American Diabetes Association. Management of diabetes in the perioperative setting. *Diabetes Care.* 2022;45(Suppl 1):S143-S161.
42. National Institute for Health and Care Excellence. Diabetes in adults: management. NICE guideline [NG12]. London: NICE; 2019.
43. Scottish Intercollegiate Guidelines Network. Guidelines for the management of the perioperative adult diabetic patient. NISL guideline [NG159]. Edinburgh: SIGN; 2019.
44. Abbas. Z, B. A. (2022). Diabetic foot ulcer disease in African Continent - Review of diabetic foot in last 60 years -1960 to 2020. *Diabetic Research and Clinical Practise.*
45. Amogne W., R. A. (2011). A Diabetic Foot disease in Ethiopian patients: a hospital based study. *Ethopian Journal of Health Department*, 25 (1): 17-21.

46. Boulton AJ, A. D. (2008). Comprehensive foot examination and risk assessment: a report of the task force of the foot care interest group of the American Diabetes Association, with endorsement by the American Association of Clinical Endocrinologists. *Diabetes Care*. . *Diabetes Care*.
47. Brocklehurst, J. D. (2023). The Validity and Reliability of SINBAD ClassificationSystem for Diabetic Foot Ulcers. *Pubmed*.
48. Hoffstand O, M. N. (2015). Diabetes lower-extremity amputation and diabetes. *Diabetes Care*, 38: 1852-1857.
49. Marta Wysocka-Mincewicz, E. S. (2023). Foot Plantar Pressure Abnormalities in Near Adulthood Patients with Type 1 Diabetes. *Biomechanics*, 11, 2901.
50. in Near Adulthood Patients with Type 1 Diabetes. *Biomechanics*, 11, 2901.
51. Sidawy AN, P. B. (2019). Rutherford's vascular and endovascular therapy. Philadelphia: Elsevier.
52. T.Schmeltzpfenning, T. B. (n.d.). Foot biomechanics and gait. In *Handbook of Foot Design and Manufacturer*.
53. Zhang P, L. J. (2017). Global epidemiology of diabetic foot ulceration: A systematic review and meta-analysis. *Annals of Medicine*, 49: 106-116.
54. Crowther CA, Samuel D, Hughes R, Tran T, Brown J, et al. (2022) Tighter or less tight glycaemic targets for women with gestational diabetes mellitus for reducing maternal and perinatal morbidity: A stepped-wedge, cluster-randomised trial. *PLOS Medicine* 19(9): <https://doi.org/10.1371/journal.pmed.1004087>
55. Crowther CA, Samuel D, Hughes R, Tran T, Brown J, et al. (2022) Tighter or less tight glycaemic targets for women with gestational diabetes mellitus for reducing maternal and perinatal morbidity: A stepped-wedge, cluster-randomised trial. *PLOS Medicine* 19(9): <https://doi.org/10.1371/journal.pmed.1004087>
56. Sacks DA, Metzger BE. Classification of diabetes in pregnancy: time to reassess the alphabet. *Obstet Gynecol*. 2013 Feb;121(2 Pt 1):345-348. doi: 10.1097/AOG.0b013e31827f09b5. PMID: 23344285.
57. Hartling L, Dryden DM, Guthrie A, Muise M, Vandermeer B, Donovan L. Benefits and harms of treating gestational diabetes mellitus: a systematic review and meta-analysis for the U.S. Preventive Services Task Force and the National 57. Institutes of Health Office of Medical Applications of Research. *Ann Intern Med*. 2013 Jul 16;159(2):123-9. doi: 10.7326/0003-4819159-2-201307160-00661. PMID: 23712381.
58. Balsells M, García-Patterson A, Gich I, Corcoy R. Ultrasound-guided compared to conventional treatment in gestational diabetes leads to improved birthweight but more insulin treatment: systematic review and meta-analysis. *Acta Obstet Gynecol Scand*. 2014 Feb;93(2):144-51. doi: 10.1111/aogs.12291. Epub 2013 Dec 24. PMID: 24372329.
59. Butalia S, Gutierrez L, Lodha A, Aitken E, Zakariasen A, Donovan L. Short- and long-term outcomes of metformin compared with insulin alone in pregnancy: a systematic review and meta-analysis. *Diabet Med*. 2017 Jan;34(1):27-36. doi: 10.1111/dme.13150. Epub 2016 Jun 8. PMID: 27150509.
60. Nicholson W, Bolen S, Witkop CT, Neale D, Wilson L, Bass E. Benefits and risks of oral diabetes agents compared with insulin in women with gestational diabetes: a systematic review. *Obstet Gynecol*. 2009 Jan;113(1):193-205. doi: 10.1097/AOG.0b013e318190a459. PMID: 19104375.
61. IADPSG Consensus Panel International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. *Diabetes Care* 2010; 33:676-682

62. Report of a World Health Organization Consultation Diagnostic criteria and classification of hyperglycaemia first detected in pregnancy: A World Health Organization Guideline. *Diabetes Research and Clinical Practice* 2014;103: 341-63.
63. HAPO Study Cooperative Research Group; Metzger BE, Lowe LP, Dyer AR, et al. Hyperglycemia and adverse pregnancy outcomes. *N Engl J Med.* 2008 May 8;358(19):1991-2002. doi: 10.1056/NEJMoa0707943. PMID: 18463375McElwee ER, Oliver EA, McFarling K, et al. Risk of Stillbirth in Pregnancies Complicated by Diabetes, Stratified by Fetal Growth. *Obstet Gynecol.* 2023 Apr 1;141(4):801-809. doi: 10.1097/AOG.00000000000005102. Epub 2023 Mar 9. PMID: 36897128.
64. Crowther CA, Hiller JE, Moss JR, et al; Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS) Trial Group. Effect of treatment of gestational diabetes mellitus on pregnancy outcomes. *N Engl J Med.* 2005 Jun 16;352(24):2477-86. doi: 10.1056/NEJMoa042973. Epub 2005 Jun 12. PMID: 15951574.
65. Dude A, Niznik CM, Szmuiłowicz ED, et al. Management of Diabetes in the Intrapartum and Postpartum Patient. *Am J Perinatol.* 2018 Sep;35(11):1119-1126. doi: 10.1055/s-0038-1629903. Epub 2018 Mar 13. PMID: 29534258; PMCID: PMC6119114.
66. ElSayed NA, Aleppo G, Aroda VR, et al. Management of Diabetes in Pregnancy: Standards of Care in Diabetes-2023. *Diabetes Care.* 2023 Jan 1;46(Suppl 1):S254-S266. doi: 10.2337/dc23-S015. PMID: 36507645; PMCID: PMC9810465.
67. Lowe, William L., et al. "Maternal glucose levels during pregnancy and childhood adiposity in the Hyperglycemia and Adverse Pregnancy Outcome Follow-up Study." *Diabetologia* 62 (2019): 598-610.
68. Hartling L, Dryden DM, Guthrie A, et al. Benefits and harms of treating gestational diabetes mellitus: a systematic review and meta-analysis. *Ann Intern Med.* 2013 Jul 16;159(2):123-9. doi: 10.7326/0003-4819-159-2-201307160-00661. PMID: 23712381.
69. Landon MB, Spong CY, Thom E, et al. A multicentre, randomized trial of treatment for mild gestational diabetes. *N Engl J Med.* 2009 Oct 1;361(14):1339-48. doi: 10.1056/NEJMoa0902430. PMID: 19797280; PMCID: PMC2804874.
70. Harrison RK, Cruz M, Wong A, Davitt C, et al. The timing of initiation of pharmacotherapy for women with gestational diabetes mellitus. *BMC Pregnancy Childbirth.* 2020 Dec 11;20(1):773. doi: 10.1186/s12884-020-03449-y. PMID: 33308193; PMCID:
71. National Institute for Health and Care Excellence. Diabetes in pregnancy: management of diabetes and its complications from preconception to the postnatal period. National Collaborating Centre for Women's and Children's Health. February 25, 2015; NICE Guideline 3: version 2.1. <https://www.nice.org.uk/guidance/ng3/chapter/1Recommendations#gestational-diabetes-2>.
72. Hod M, Kapur A, Sacks DA, Hadar E, et al. The International Federation of Gynecology and Obstetrics (FIGO) Initiative on gestational diabetes mellitus: A pragmatic guide for diagnosis, management, and care. *Int J Gynaecol Obstet.* 2015 Oct;131 Suppl 3:S173-211. doi: 10.1016/S0020-7292(15)30033-3. PMID: 26433807.
73. Brown J, Martis R, Hughes B, Rowan J, Crowther CA. Oral anti-diabetic pharmacological therapies for the treatment of women with gestational diabetes. *Cochrane Database Syst Rev.* 2017 Jan 25;1(1):CD011967. doi: 10.1002/14651858.CD011967.pub2. PMID: 28120427; PMCID: PMC6464763.

74. Catalano PM, McIntyre HD, Cruickshank JK, McCance DR, Dyer AR, Metzger BE, Lowe LP, Trimble ER, Coustan DR, Hadden DR, Persson B, Hod M, Oats JJ; HAPO Study Cooperative Research Group. The hyperglycemia and adverse pregnancy outcome study: associations of GDM and obesity with pregnancy outcomes. *Diabetes Care*. 2012 Apr;35(4):780-6. doi: 10.2337/dc111790. Epub 2012 Feb 22. PMID: 22357187; PMCID: PMC3308300
75. Patel NU, Roach C, Alinia H, Huang WW, Feldman SR. Current treatment options for acanthosis nigricans. *Clin Cosmet Investig Dermatol* 2018; 11: 407-413.
76. Popa ML, Popa AC, Tanase C, Gheorghisan-Galateanu AA. Acanthosis nigricans: To be or not to be afraid (Review). *Oncol Lett* 2019; 17: 4133-4138.
77. Kutlubav Z, Engin B, Bairmov O, Tüzün Y. Acanthosis nigricans: A fold (intertriginous) dermatosis. *Clin Dermatol* 2015; 33: 466-470.
78. Balak DMW. Topical trifarotene: A new retinoid. *Br J Dermatol* 2018; 179: 231-232.
79. Lee et al., (2016), "Topical ketamine-amitriptyline-lidocaine for chronic pruritus: A retrospective study assessing efficacy and tolerability, American Academy of Dermatologists (AAD)
80. National Institute of Dental and Craniofacial Research National Oral Health Information Centre 1 NOHIC Way Bethesda, MD 20892–35001–866–232–4528; www.nidcr.nih.gov
81. [Diabetes | American Dental Association \(ada.org\)](http://Diabetes | American Dental Association (ada.org)) accessed 21 June 2023
82. Lamster IB, Lalla E, Borgnakke WS, Taylor GW. The relationship between oral health and diabetes mellitus. *J Am Dent Assoc* 2008;139 Suppl:19s-24s.
83. Al-Maskari AY, Al-Maskari MY, Al-Sudairy S. Oral Manifestations and Complications of Diabetes Mellitus: A review. *Sultan Qaboos Univ Med J*. 2011 May;11(2):179-86. Epub 2011 May 15. PMID: 21969888; PMCID: PMC3121021.
84. P. Preshaw, S. Bissett, Periodontitis and Diabetes: *British Dental Journal* 11 October 2019
85. P. M. Preshaw & A. L. Alba & D. Herrera & S. Jepsen & A. Konstantinidis & K. Makrilakis & R. Taylor: Periodontitis and diabetes: a two-way relationship; *Diabetologia* (2012) 55:21–31
86. S. Stoica, G. Valentini, M. Dolci, S. D'Agostino; Diabetes and Non-Surgical Periodontal Therapy: What can we hope for?; 2022 2(2) 85-93
87. K.T. Deep, K. Shalini, B. Amit; Supportive Periodontal Therapy: Need of the Hour; *Universal Research Journal of Dental Sciences* 2017.04 (06), 1-
88. National Institute of Dental and Craniofacial Research National Oral Health Information Centre 1 NOHIC Way Bethesda, MD 20892–35001–866–232–4528; www.nidcr.nih.gov
89. Allweiss, P. and Albright, A. (2011). Diabetes, disasters and decisions. *Diabetes Management*, 1(4), pp.369–377. doi:<https://doi.org/10.2217/dmt.11.31>.
90. Prof A.Jenkins, Prof T.Kadowaki, Prof M.Lee (July 2022). Diabetes Care and Disaster IDF Western Pacific Region , pp.26-34
91. National Institute of Dental and Craniofacial Research National Oral Health Information Centre 1 NOHIC Way Bethesda, MD 20892–35001–866–232–4528; www.nidcr.nih.gov

18.0 Annexes

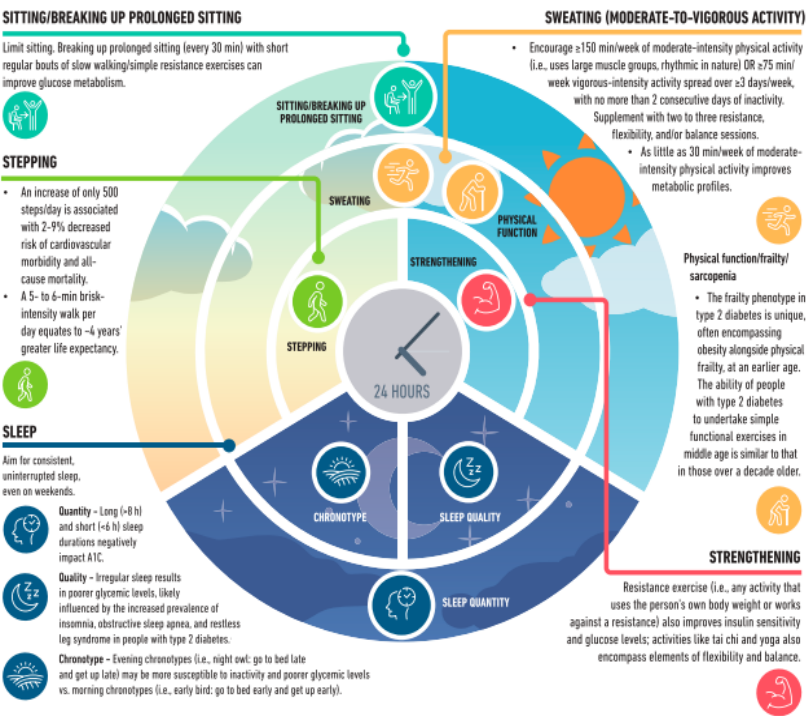
Annex 1: GI table

	Low GI	Medium GI	High GI
Breads	<ul style="list-style-type: none"> • Mixed grain bread • Oat bran bread 	<ul style="list-style-type: none"> • Wholemeal bread • Pita bread 	<ul style="list-style-type: none"> • White bread • Gluten free white bread
Cereals	<ul style="list-style-type: none"> • Raisin bread • Rolled oats/porridge • All bran • Muesli 	<ul style="list-style-type: none"> • Nutri-grain • Wheatbix • Vitabrits • Sultana bran 	<ul style="list-style-type: none"> • Rice bubble • Cornflakes • Cocoa pops • Fruit loops • Fruity mix
Grains	<ul style="list-style-type: none"> • Pasta • Noodles • Semolina • Whole meal flour • Brown rice • Parboiled rice 	<ul style="list-style-type: none"> • Basmati rice 	<ul style="list-style-type: none"> • White rice
Fruits	<ul style="list-style-type: none"> • Apple • Lemon • Lime • Pear • Banana • Strawberry • Guava • Grapes • Kiwi fruit • Apricot • Plum • Oranges 	<ul style="list-style-type: none"> • Papaya • Pineapple • Raisin • Cherries 	<ul style="list-style-type: none"> • Mango • Watermelon • Dried cranberries • Dates • Dried apricots
Vegetables	<ul style="list-style-type: none"> • Garlic, onion • Broccoli • Celery, lettuce • Cucumber • Spinach • Eggplants • Cauliflower • Sweet corn 	<ul style="list-style-type: none"> • Bread fruit • Beet root 	<ul style="list-style-type: none"> • Jackfruit • Carrot • Pumpkin
Legumes and pulses	<ul style="list-style-type: none"> • Kidney beans • Chickpeas • Lentils • Split peas 	<ul style="list-style-type: none"> • Cowpeas 	
Root crops	<ul style="list-style-type: none"> • Sweet potato (Kumala) • Vudi (plantain) 	<ul style="list-style-type: none"> • Cassava 	<ul style="list-style-type: none"> • Potatoes • Dalo
Dairy	<ul style="list-style-type: none"> • Whole full-fat milk • Plain yoghurt • Soy milk • Skim milk 		

Annex 2: Importance of 24-hour physical behaviours for type 2 diabetes

Ref: ADA: diabetesjournals.org/Reprinted from Davis et al., p 88

IMPORTANCE OF 24-HOUR PHYSICAL BEHAVIOURS FOR TYPE 2 DIABETES



	Glucose/insulin	Blood pressure	A1C	Lipids	Physical function	Depression	Quality of life
SITTING/BREAKING UP PROLONGED SITTING	↓	↓	↓	↓	↑	↓	↑
STEPPING	↓	↓	↓	↓	↑	↓	↑
SWEATING (MODERATE-TO-VIGOROUS ACTIVITY)	↓	↓	↓	↓	↑	↓	↑
STRENGTHENING	↓	↓	↓	↓	↑	↓	↑
ADEQUATE SLEEP DURATION	↓	↓	↓	↓	?	↓	↑
GOOD SLEEP QUALITY	↓	↓	↓	↓	?	↓	↑
CHRONOTYPE/CONSISTENT TIMING	↓	?	↓	?	?	↓	?

IMPACT OF PHYSICAL BEHAVIOURS ON CARDIOMETABOLIC HEALTH IN PEOPLE WITH TYPE 2 DIABETES

↑ Higher levels/improvement (physical function, quality of life); ↓ Lower levels/improvement (glucose/insulin, blood pressure, A1C, lipids, depression); ? No data available;
↑ Green arrows = strong evidence; ↑ Yellow arrows = medium-strength evidence; ↑ Red arrows = limited evidence.

Annex 3: Insulin dosage

1. Na^+ (corrected) = Na^+ (measured) + $[0.3 \times (\text{glucose} - 5.5)]$
2. Osmolality = $(2 \times (\text{Na} + \text{K}) + \text{glucose})$
3. Formulae for making dextrose solutions:
 - a. 500 mls D5% to 500 mls NSS is 2.5% Dextrose/ 0.45% saline
 - b. 500 mls D10% to 500 mls NSS is 5% Dextrose/ 0.45% Saline
 - c. 200 mls D50% to 800 mls NSS is 10% Dextrose 0.72% Saline
4. Starting subcutaneous insulin in children already diagnosed with diabetes:

Using twice daily intermediate /short acting regime (Mixtard)

Age	Dose Range (use higher dose for mild DKA)
Pre-pubertal child	0.5–1.2 units/kg/day
Pubertal child	0.7–2.0 units/kg/day

Divide the dose into:

- 2/3 total daily dose pre-breakfast
- 1/3 total daily dose pre-dinner

Example: 5 year old weighing 18 kg (TDD 0.5 units/kg/day = 9U)

- Pre-breakfast = $2/3 \times 9 \text{ units} = 6 \text{ units}$ (Mixtard)
- Pre-dinner = $1/3 \times 9 \text{ units} = 3 \text{ units}$ (Mixtard)

There are other insulin preparations in the market.

5. Sliding Scale Insulin: Alternate empiric dose; also used for transition orders using short acting insulin

CBG in mmol/L	CBG in mg/dL	Dose of short acting insulin
0–8.3	0–150 mg/dL	0 units
8.4–11	151–200 mg/dL	2 units
11.1–13.9	201–250 mg/dL	4 units
14–16.6	251–300 mg/dL	6 units
16.7–19.4	301–350 mg/dL	8 units
19.5–22.2	351–400 mg/dL	10 units
≥ 22.3	$\geq 401 \text{ mg/dL}$	12 units

Table 9.1 — Examples of Subcutaneous Insulin Regimens

Timing and Distribution	Advantages:	Disadvantages:	Adjusting Doses:	
Regimens that more closely mimic normal insulin secretion				
Insulin pump therapy (hybrid closed- loop, low glucose suspend, CGM – augmented open loop, BGM- augmented open loop)	<ul style="list-style-type: none">- Basal delivery of URAA or RAA; generally, ~40–60% of TDD.- Mealtime and correction: URAA or RAA by bolus based on ICR and on ISF.- Pre-meal insulin ~15 min before eating.	<ul style="list-style-type: none">- Can adjust basal rates for varying insulin sensitivity by time of day.- Flexible; can time and dose for meals and exercise.- Flexibility in meal timing and size.- Pump can deliver insulin in increments of 0.1 units.- Potential for integration with CGM for automated systems (hybrid closed-loop).- TR is highest and TR % lowest with hybrid closed-loop > low-glucose suspend > CGM-augmented open-loop > BGM-open loop.	<ul style="list-style-type: none">- Most expensive regimen.- Must continuously wear one or more devices.- Risk of rapid development of ketones if DKA with interruption of insulin delivery.- Potential reactions to adhesives and infusion sets.- Most technically complex approach (harder for people with lower numeracy or literacy skills).	<ul style="list-style-type: none">- Mealtime insulin: if carbohydrate counting is accurate, change ICR if glucose patterns reflect need for more or less insulin.- Correction factor: adjust if glucose correction exceeds or falls short of expected ISF.- Basal: If large overnight trends (up or down), fasting glucose, and variances suggest need for basal adjustment.
Regimen: MDI: LAA + flexible doses of URAA or RAA at meals	<ul style="list-style-type: none">- LAA once daily (insulin detemir or insulin glargine) or twice daily (NPH, premixed).- Mealtime and correction: URAA or RAA based on ICR and ISF and target glucose.	<ul style="list-style-type: none">- Can use pens for all components.- Flexibility in meal timing and content.- Insulin analogs cause less hypoglycemia than human insulins.	<ul style="list-style-type: none">- At least four daily injections.- Insulin pens are costly.- Smallest increment of insulin is 0.5–1.0 units with most pens.- LAAs may not cover strong dawn phenomenon (rise in glucose in early morning hours) as well as pump therapy.	<ul style="list-style-type: none">- Mealtime insulin: if carbohydrate counting is accurate, change ICR if glucose patterns reflect need for more or less insulin.- Correction factor: adjust if glucose correction exceeds or falls short of expected ISF.- LAA: Based on overnight or daytime glucose curves; adjust for fasting glucose or outside-of-target glucose
Regimen: Twice-daily “split/mixed”: N + R or N + RAA.	<ul style="list-style-type: none">- Pre-breakfast: ~40% N + ~15% R or RAA.- Pre-dinner: ~30% N + ~15% R or RAA.	<ul style="list-style-type: none">- Least number of injections for people with strong preference for this.- Insulins can be mixed in one syringe.- Least (N+R) or (N+RAA) expensive insulins vs. analogs.- Eliminates need for doses during the day.	<ul style="list-style-type: none">- Risk of hypoglycemia in afternoon or middle of the night.- Fixed mealtimes and meal content.- Coverage of post-lunch glucose often suboptimal.- Difficult to reach targets for blood glucose without hypoglycemia.	<ul style="list-style-type: none">- Morning N: based on pre-dinner BGM.- Morning R/RAA: based on pre-lunch BGM.- Morning N+RAA: based on post-breakfast or pre-lunch BGM.- Evening R/RAA: based on post-dinner or bedtime BGM.- Evening N: based on fasting BGM.

Notes:

BGM = blood glucose monitoring; CGM = continuous glucose monitoring; ICR = insulin-to-carbohydrate ratio; ISF = insulin sensitivity factor; LAA = long-acting analog; MDI = multiple daily injections; N = NPH insulin; R = short-acting (regular) insulin; RAA = rapid-acting analog; TDD = total daily insulin dose; URAA = ultra-rapid-acting analog.

Annex 4: Key intervention points and associated action required

KEY INTERVENTION POINTS	ACTION – KEY TASKS
No diabetes*	<p>Keep the healthy, healthy.</p> <p>Prevent the healthy population from developing risk factors.</p> <p>Increase public awareness of risk factors, the significance of risk factors and risk factor reduction strategies.</p>
Pre-diabetes (At-risk people)	<p>Reduce risk factors in the 'at risk' population* SNAPSS intervention to reduce risk factors.</p> <p>Support goal directed research into causes of and preventive interventions.</p>
Undiagnosed diabetes*	<p>Active NCD Tool Kit Screening for people over 30 years of age.</p> <p>Provide avenues for opportunistic screening as well (workplaces, festivals, etc.) Increase public awareness of symptoms, risk factors and where people can go for screening.</p>
KNOWN DIABETES <ul style="list-style-type: none"> • At diagnosis • Established uncomplicated diabetes • Diabetes with complications 	<p>Provide services for:</p> <ul style="list-style-type: none"> - Clinical care according to guidelines (DMG, IECs) - Education in self-care and monitoring (PDRB) - Information about recommendations for clinical care (personal targets for control) <p>Provide services for:</p> <ul style="list-style-type: none"> - Routine monitoring of diabetic and general health status - Regular screening for complications - Management of problems as they arise - Reinforcement of self-care education - Affordable therapies and supplies. <p>Implement programmes for:</p> <ul style="list-style-type: none"> - Identification and reduction of risks for diabetes complications - Self-care education and psychosocial support - Support goal directed research aimed at curing diabetes. <p>Provide services for:</p> <ul style="list-style-type: none"> - Prevention of the progression of complications - Self-care education and psychosocial support - Rehabilitation of people with disabilities - Palliation for people with end-stage complications <p>Support goal directed research aimed at the reversal of complications.</p>

****Until modifiable risk factors are identifiable and effective interventions available, these interventions cannot be applied to type 1 diabetes.***

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems?
(Use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + + +
=Total Score:

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all ☐	Somewhat difficult ☐	Very difficult ☐	Extremely difficult ☐
--	--	--	---

Annex 6: PHQ-9 Patient Health Questionnaire

For initial diagnosis:

1. Patient completes PHQ-9 Quick Depression Assessment
2. If there are at least 4 ✓ in the shaded section (one of which corresponds to question #1 or #2)

Consider Major Depressive Disorder

- if there are at least 5 ✓ in the shaded section (one of which corresponds to Question #1 or #2)

Consider other Depressive Disorder

- if there are 2–4 ✓ in the shaded section (one of which corresponds to Question #1 or #2)

Note: Since the questionnaire relies on patient self-report, all responses should be verified by the clinicians and a definitive diagnosis is made on clinical grounds taking into account how well the patient understood diagnoses of Major Depressive or Other Depressive Disorder also require impairment of social occupational, or other important areas of functioning (Q #10) and ruling out normal bereavement, a history of Manic Episode (bipolar disorder). And a physical disorder, medication or other drug as the biological cause of the depressive symptoms.

To monitor severity over time for newly diagnosed patients or patients in current treatment for depression:

1. Patients may complete questionnaires at baseline and at regular intervals (e.g. every 2 weeks) at home and bring them in their next appointment for scoring or they may complete the questionnaire during each scheduled appointment.
2. Add up ✓ by column. For every ✓ several days = 1 More than half the day = 2 Nearly every day = 3
3. Add up ✓ by column scores to get a TOTAL score
4. Refer to the accompanying **PHQ-9 Scoring Box** to interpret the TOTAL score
5. Results may be included in patient's files to assist you in setting up a treatment goal, determining degree of response, as well as guiding treatment intervention.

Scoring: add up all checked boxes on PHQ-9

For every ✓ Not at all= 0; several days = 1;

More than half the days = 2; nearly every day = 3

Interpretation of Total Score

Total Score	Depression
1–4	Minimal depression
5–9	Mild Depression
10–14	Moderate depression
15–19	Moderately severe depression
20–27	Severe depression

Annex 7: Diabetes Notification Form

NO: DB 20151		DIABETES NOTIFICATION		Registry NO:	
DIABETES NOTIFICATION (New cases only)					
Health Centre/Hospital:				National Health Number (NHN):	
Name:			Father's Name:		
Age:	DOB: / /	Ethnicity	☐ itaukei	☐ Fijian Indian Descent	☐ Fijian other Descent
		Residential Address:			

NO: 11502		DIABETES NOTIFICATION		Registry NO:	
DIABETES NOTIFICATION (New cases only)					
Health Centre/Hospital:				National Health Number (NHN):	
Name:			Father's Name:		
Age:	DOB: / /	Ethnicity: ☐ Hindu ☐ Fijian Indian Descent ☐ Fijian Other Descent	Residential Address:		
Gender: ☐ Male ☐ Female		☐ If other, state ethnicity:			
Occupation:			Telephone Number (landline/mobile):		
Symptoms (tick as many as apply): ☐ Weight loss ☐ Polyuria ☐ Polydipsia ☐ Lethargy ☐ Pruritus Vulvae ☐ Balanitis					
☐ If others, state:					
Family History:					
Risk factors (select as many as apply): ☐ > 50 year olds ☐ High Risk Ethnicity ☐ Previous history of GDM ☐ Family history of DM ☐ Physical inactivity					
☐ Macro-vascular disease ☐ Hypertension ☐ Dyslipidaemia ☐ Obesity ☐ If others, state:					
Blood Sugar at diagnosis (select one): ☐ FBS Level: _____ ☐ RBS Level: _____ ☐ GTT Level: _____					
Date of Diagnosis of DM: / /		HbA1c Level: _____			
Neuropathy Indicators: Foot examination (select as many as apply):-					
☐ Ulcers. If present indicate site: _____		☐ Monofilament test results: _____			
☐ Foot sepsis. If present indicate site: _____		☐ Charcot's Joint. If present indicate site: _____			
☐ Calluses. If present indicate site(s): _____		☐ Abnormal Reflexes. If present indicate site(s): _____			
☐ Others. Please explain: _____					
Nephropathy Indicators: Serum Urea: _____ Serum Creatinine: _____					
Creatinine Clearance: _____		24 Hour Urine Test: _____			
Indicate Level of Renal Impairment (select one): ☐ No impairment ☐ Mild impairment (reversible) ☐ Acute Renal Failure ☐ Chronic Renal Failure					
☐ On dialysis					
Lipid Indicators: Cholesterol: _____		Triglyceride: _____		HDL: _____	
LDL: _____		Cholesterol:HDL ratio: _____			
Eye Indicators (select as many as apply):					
☐ Visual Acuity. State VA in both eyes: _____		☐ Retinopathy. If present indicate site(s): _____			
☐ Macular Degeneration. If present indicate site(s): _____		☐ Glaucoma. If present indicate site(s): _____			
☐ Others. If present Please specify: _____					
BMI (w/h ²): _____		Weight: _____ kg		Height: _____ m	
Therapy: ☐ Pharmaceutical:					
☐ Metformin: Dosage: _____		☐ Glipizide: Dosage: _____			
☐ Glibenclamide: Dosage: _____		☐ Insulin: Indicate type of insulin & Dosage: _____			
☐ Others: Please state medication and dosage in detail: _____					
☐ Non pharmaceutical: List therapy: _____					
Follow up facility: _____					
Any additional comments: _____					
Notified by: _____		Address: _____			
Signature: _____		Date: / /		Stamp: _____	
<small>Notes:</small> 1. All the required fields: needs to be filled in detail and submitted to Health Information Unit. PLEASE NOTE: Send by the end of every week. The Health Information Unit prepares a checklist of all the facilities reporting. The feedbacks are submitted to facilities as quarterly reports. 2. Gestational Diabetes is not included in this Notification form. Please do not report Gestational Diabetes on this form.					

NO: 11502		DIABETES NOTIFICATION		Registry NO:
DIABETES NOTIFICATION (New cases only)				
Health Centre/Hospital			National Health Number (NHN):	
Name:			Father's Name:	
Age: DOB: / /	Ethnicity: ☐ 汉族 ☐ Fijian Indian Descent ☐ Fijian Other Descent	Residential Address:		
Gender: ☐ Male ☐ Female	☐ If other, state ethnicity:			
Occupation:		Telephone Number (landline/mobile):		
Symptoms (tick as many as apply): ☐ Weight loss ☐ Polyuria ☐ Polydipsia ☐ Lethargy ☐ Pruritus/Vulvae ☐ Balanitis				
☐ If others, state:				
Family History:				
Risk factors (select as many as apply): ☐ > 30 year olds ☐ High Risk Ethnicity ☐ Previous history of GDM ☐ Family history of DM ☐ Physical inactivity				
☐ Macro-vascular disease ☐ Hypertension ☐ Dyslipidemia ☐ Obesity ☐ If others, state:				
Blood Sugar at diagnosis (select one): ☐ FBS Level: _____ ☐ RBS Level: _____ ☐ GTT Level: _____				
Date of Diagnosis of DM: / / HbA1c Level: _____				
Neuropathy Indicators: Foot examination (select as many as apply):-				
☐ Ulcers. If present indicate site: _____ ☐ Monofilament test results: _____				
☐ Foot sepsis. If present indicate site: _____ ☐ Charcot's Joint. If present indicate site: _____				
☐ Calluses. If present indicate site(s): _____ ☐ Abnormal Reflexes. If present indicate site(s): _____				
☐ Others. Please explain: _____				
Nephropathy Indicators: Serum Urea: _____ Serum Creatinine: _____				
Creatinine Clearance: _____ 24 Hour Urine Test: _____				
Indicate Level of Renal Impairment (select one): ☐ No impairment ☐ Mild impairment (reversible) ☐ Acute Renal Failure ☐ Chronic Renal Failure				
☐ On dialysis				
Lipid Indicators: Cholesterol: _____ Triglyceride: _____ HDL: _____				
LDL: _____ Cholesterol:HDL ratio: _____				
Eye Indicators (select as many as apply):				
☐ Visual Acuity. State VA in both eyes: _____ ☐ Retinopathy. If present indicate site(s): _____				
☐ Macular Degeneration. If present indicate site(s): _____ ☐ Glaucoma. If present indicate site(s): _____				
☐ Others. If present Please specify: _____				
BMI (wt/2): _____		Weight: _____ kg		Height: _____ m
Therapy: ☐ Pharmaceutical:				
☐ Metformin: Dosage: _____ ☐ Glipizide: Dosage: _____				
☐ Glimepiride: Dosage: _____ ☐ Insulin: Indicate type of insulin & Dosage: _____				
☐ Others: Please state medication and dosage in detail: _____				
☐ Non pharmaceutical: List therapy: _____				
Follow up facility:				
Any additional comments:				
Notified by:		Address:		
Signature:		Date: / /		Stamp:
Notes: 1. All the required fields needs to be filled in detail and submitted to Health Information Unit. PLEASE NOTE: Send by the end of every week. The Health Information Unit prepares a checklist of the facilities reporting. The feedbacks are submitted to facilities as quarterly reports. 2. Gestational Diabetes is not included in this Notification form. Please do not report Gestational Diabetes in this form.				

Archive Copy

Contact: Health-Information@govnet.gov.fj

NO: DB 20151

DIABETES NOTIFICATION

Registry NO

DIABETES NOTIFICATION (New cases only)

Health Centre/Hospital:		National Health Number (NHN):	
Name:		Father's Name:	
Age DOB / /	Ethnicity ☐ Itzukul ☐ Fijian Indian Descent ☐ Fijian other Descent	Residential Address:	
Gender: ☐ Male ☐ Female	☐ If others, state ethnicity:		
Occupation:	Telephone Number(landline/mobile):		
Symptoms (tick as many as apply) ☐ Weight loss ☐ Polyuria ☐ Polydipsia ☐ Lethargy ☐ Pruritus Vulvae ☐ Balanitis			
☐ If others, state:			
Family history:			
Risk factors (select as many as apply): ☐ > 30 year olds ☐ High Risk Ethnicity ☐ Previous history of GDM ☐ Family history of DM ☐ Physical inactivity			
☐ Macro-vascular disease ☐ Hypertension ☐ Dyslipidaemia ☐ Obesity ☐ If others, state			
Blood Sugar at diagnosis (select one) ☐ FBS Level: ☐ RBS Level: ☐ GTT Level:			
Date of Diagnosis of DM / / HbA1c Level:			
Neuropathy Indicators:Foot examination (select many as apply)			
☐ Ulcer: If present indicate site: ☐ Monofilament test results:			
☐ Foot sepsis: If present indicate site: ☐ Charcot's joint: If present indicate site:			
☐ Calluses: If presents indicate site(s): ☐ Abnormal Reflexes: If present indicate site(s):			
☐ Others: Please explain:			
Nephropathy Indicators: Serum Urea: Serum Creatinine:			
Creatinine Clearance: 24 Hour Urine Test:			
Indicate Level of Renal Impairment (select one): ☐ No impairment ☐ Mild Impairment (reversible) ☐ Acute Renal Failure ☐ Chronic Renal Failure			
☐ On dialysis			
Lipid Indicators: Cholesterol: Triglyceride: HDL:			
LDL: Cholesterol: HDL ratio:			
Eye Indicators (select as many as apply)			
☐ Visual Acuity: State VA in both eyes: ☐ Retinopathy: If present indicate site:			
☐ Macular Degeneration: If present indicate site(s): ☐ Glaucoma: If present indicate site(s):			
☐ Others: If present Please specify:			
BMI (wt/2): Weight: kg Height: m			
Therapy ☐ Pharmaceutical:			
☐ Metformin: Dosage: ☐ Glipizide: Dosage:			
☐ Glibenclamide: Dosage: ☐ Insulin: Indicate type of insulin & Dosage:			
☐ Others: Please state medication and dosage in detail:			
☐ Non pharmaceutical: List therapy:			
Follow up facility:			
Any additional comments:			
Notified by:		Address:	
Signature:		Date: / /	
		Stamp:	
Notes:			
1. All the required fields needs to be filled in detail and submitted to the Health Information Unit. PLEASE NOTE: Send by the end of every week.			
2. Gestational Diabetes is not included in this Notification form. Please do not report Gestational Diabetes on this form.			

Health Information Unit Copy

Contact: Health-information@govnet.gov.fj



Ministry of Health and Medical Services
Dinem House
88 Amy St
Suva
Fiji

© Government of Fiji 2024

ISBN 978-982-00-1604-0



9 789820 016040