Diabetes Workforce Service Review

Report of the Diabetes Care Workforce Service Review Team to Health Workforce New Zealand

May 2011
## Table of contents

Executive Summary ........................................................................................................ 1

1. Introduction ................................................................................................................ 7

2. Population trends and diabetes care needs ................................................................. 8
   2.1 Sector activity ........................................................................................................... 8

3. Diabetes care demand .................................................................................................. 10

4. Diabetes care services – identifying gaps and needs .................................................. 12
   4.1 Diabetes awareness and prevention ....................................................................... 12
   4.2 Structured management ......................................................................................... 12
   4.3 Inconsistent education to people with diabetes ..................................................... 12
   4.4 Lack of co-ordination ........................................................................................... 12
   4.5 Effective partnerships .......................................................................................... 13
   4.6 Effective communication/electronic communication ............................................. 13
   4.7 Information technology support .......................................................................... 13
   4.8 Lack of data repository ......................................................................................... 13
   4.9 Adequate knowledge and skill ............................................................................. 13
   4.10 Active succession planning for all disciplines involved in diabetes services ......... 14
   4.11 Diabetic renal disease ......................................................................................... 14
   4.12 Lower limb injury and amputation ...................................................................... 14
   4.13 Maori workforce ................................................................................................ 14
   4.14 Hospital inpatient diabetes management ............................................................ 15
   4.15 Co-morbid conditions ......................................................................................... 15

5. Diabetes care scenarios ................................................................................................. 16

6. Diabetes care workforce ............................................................................................... 19
   6.1 NZSSD Workforce Survey .................................................................................... 20

7. Diabetes Care workforce and training issues .............................................................. 21
   7.1 Workforce ............................................................................................................. 21
      7.1.1 Nursing .......................................................................................................... 21
      7.1.2 Nurse Practitioners ....................................................................................... 22
      7.1.3 Registered Nurses ......................................................................................... 22
      7.1.4 Medical practitioners ................................................................................... 23
      7.1.5 Dietitians ....................................................................................................... 24
      7.1.6 Podiatry ........................................................................................................ 24
   7.2 Structured education for people with diabetes ....................................................... 26

8. Vision and model for diabetes care .............................................................................. 28
   8.1 Vision: .................................................................................................................. 28
   8.2 Model of care ........................................................................................................ 29
   8.3 Prevention and health promotion ......................................................................... 30
   8.4 Primary health care ............................................................................................... 30
   8.5 Community based non clinical services ............................................................. 31
   8.6 Acute care and Specialist team services .............................................................. 31
   8.7 Information technology support .......................................................................... 32
   8.8 Quality Improvement and Assurance ................................................................ 33

9. Recommendations: .................................................................................................... 34
   9.1. Prevention and Health promotion ..................................................................... 34
9.2. Service delivery
9.2.1 Primary Health Care
9.2.2 Acute and specialist services
9.2.3 Retinal Screening
9.2.4. Renal services
9.3. Information technology to support service delivery
9.4. Targeted investment in workforce training and development
9.5. People with diabetes
9.6. Quality Improvement and Assurance
9.7. National oversight and diabetes monitoring

10. Potential Demonstrations
10.1 Nurse Practitioner training programme
10.2 E-learning platform
10.3 Interdisciplinary integrated models for the management of diabetic foot complications in primary secondary and inpatient situations

11. Current innovations with potential for wider implementation
11.1 Patient structured education programme
11.2 Practice Nurse development
11.3 Multifaceted outreach services in rural and disadvantaged areas
11.4 Shared care records

12. References

Appendix A: Diabetes and Cardivascular Disease Quality Improvement Plan recommendations
Appendix B: Diabetes Service Workforce Review Group
Appendix C: Predicted diabetes prevalence
Appendix D: Diabetes prevalence by region and ethnicity
Appendix E: Prevalence data for type 1 diabetes under the age of 15 years in the Canterbury district
Appendix F: Scenario one - Type 2 diabetes
Appendix G: Scenario two - Type 1 diabetes in children
Appendix H: Scenario three - Type 1 diabetes adults (over the age of 18 years)
Appendix I: Diabetes Model of Care
Glossary
Executive Summary

This Health Workforce New Zealand diabetes service workforce review was conducted in the context of increasing demand for diabetes care services across the health continuum and limited funding in the future.

The review was completed in May 2011 by the review team and was informed by literature, diabetes care service and workforce data, population and forecasting data, patient experience in diabetes care, and also innovations that are occurring in diabetes care services in New Zealand. This report is the output of the review submitted to Health Workforce New Zealand for consideration.

The review identified the following:

- Diabetes prevalence is increasing in New Zealand at a mean rate of 8-9% compounded per annum and is a high priority for the Ministry of Health
- Diabetes incidence rates are expected to increase 1.5% per year (reflecting the obesity epidemic)
- In 2011, the estimated number of people with diabetes is 237156 and is estimated to increase by 50% over by 2021 without effective prevention programmes
- Diabetes prevalence is higher among Maori (5-10%), Pacific (4-8%) and Asian Indian (4%) populations compared with New Zealanders of European descent (3%)
- About 90% of those with diabetes have type 2 diabetes (T2DM), but the prevalence of both type 1 diabetes (T1DM) and gestational diabetes (GDM) is also increasing
- Type 2 diabetes is increasingly being diagnosed at younger ages, and even in childhood
- Mortality is expected to decrease at a faster rate among people with diabetes than people without diabetes due to the better management of diabetes
- Government health spending to treat type 2 diabetes could increase to approximately $1,600 - $1,800 million per annum by 2020 (2006 dollars), in the absence of any further prevention initiatives If resources required to provide health services to people with type 2 diabetes rise to the level indicated above, diabetes treatment costs will represent approximately 15% of Vote Health (compared to 3% of Vote Health in 2006), potentially crowding out other government funded health treatments and services.

The Ministry of Health and District Health Boards have a joint work programme for diabetes and cardiovascular disease quality improvement, led by a steering group. The programme continues the work started under the framework of the Diabetes and Cardiovascular Disease Quality Improvement Plan 2008. The group coordinates the implementation of the Diabetes/Cardiovascular quality improvement initiatives. The programme includes a number of interrelated projects managed in groups according to the
goals of the QIP. Four examples of progress on the recommendations in the QIP are:

- the registered nurse practising in diabetes health prescribing demonstration project
- the New Zealand Guidelines Group - new treatment algorithms
- translational research
- projects targeting kidney disease.

Diabetes care demand:
Diabetes has no boundaries. It is a complex multi-system metabolic disease affecting all age groups. In addition, co-existent medical conditions (and/or their therapies) may either lead to, or exacerbate, metabolic disturbance, such as steroid therapy in asthma or cancer. The number of people with diabetes requiring care will continue to rise across all health care settings for the foreseeable future. Appropriate expertise will be required for all types of diabetes (mostly type 1, type 2 and gestational diabetes) now and into the future, and different expertise will be required to meet the complex demands.

Diabetes care services:
Diabetes care in New Zealand is provided in a variety of settings across the health continuum. Improvements are required to ensure enhancements in the structured management of diabetes and co-ordination between the multiple providers. Information technology is seen to be integral to achieving integrated services. Three scenarios have been developed (adapted from Diabetes UK) depicting present care pathways. With the growing demand the review group did not foresee the ‘what’ and the ‘who’ changing significantly in 2020 but there will be significant changes in the ‘how’.

Diabetes care workforce and training:
People with diabetes have differing health care needs relating to their diabetes subsequently the diabetes workforce comprises a large multidisciplinary team spanning the health continuum and service providers with varying levels of expertise. As diabetes occurs across the lifespan and concomitantly with many other conditions, multiple services are required at different times or at the same time. Workforce surveys reveal inadequate provision of core disciplines in diabetes care (medical, nursing, dietetic and podiatry), little or no succession planning and inadequate training positions. Structured patient education is delivered inconsistently and is not always evidence-informed; a national curriculum in patient education is needed.

Vision:
Diabetes health services in New Zealand will be high quality, patient-focused and integrated across the health continuum from prevention to tertiary care, thereby reducing the diabetes burden and enabling optimum health outcomes to be achieved for people with diabetes, a multi-system disease affecting all age groups.
Thus, in 2020:

- The burden of disease and the number of people with diabetes will be decreasing as the result of effective diabetes prevention programmes.
- People with diabetes will play an increased role in the management of their condition/s and will have access to evidence-informed clinical services in which they are considered central and feel empowered to participate.
- Care will be consistent, based on evidence-informed guidelines and agreed standards.
- Health care providers will utilise appropriate communication skills that are responsive to individuals with diabetes within consultations, and communicate effectively with other health care providers.
- Effective collaborative partnerships between different providers, and between providers and people with diabetes will be the norm.
- The use of information technology will support people with diabetes to participate to their fullest potential (e.g. the patient portal\(^1\)), and to support clinicians in the delivery of co-ordinated services.
- Services will be more mobile and where appropriate more care will be provided remotely using electronic means of communications.
- Information technology will be embedded and telemedicine will support clinical consultations and decision-making.
- Integration of information technology systems will allow relevant patient data to be safely accessible by all diabetes health service providers to reduce duplication of care and documentation.
- There will be a focus on reducing duplication and funding models will keep abreast of technology and changing care delivery models.
- Funding models will focus on outcomes rather than volumes only.
- There will be a recognition of the requirement for expanding volumes in specialist services as the complexity increases.
- Accountability for delivery of services will be exercised through more robust contracting and funding processes.

**Recommendations:**
For all recommendations consideration must be given to culture, age, socioeconomic factors, language, health literacy, and accessibility.

1. **Prevention and Health promotion**
   - A co-ordinated national population based diabetes prevention programme should be implemented to prevent or delay the onset of type 2 diabetes and its related conditions.
   - Primary health care services should actively identify and manage high risk individuals.
   - Health promotion programmes should be developed in partnership with communities and delivered by those with the most appropriate expertise (e.g. Ngati and Healthy, Let’s Beat Diabetes).

\(^1\) Patient portals are health-care related online applications that allow patients to interact and communicate with their health care providers.
2. **Service delivery**
- Implementation of the recommendations in Cardiovascular and Diabetes Quality Improvement Plan should continue
- Funding models should support interdisciplinary care and innovative practice
- Communication between patients’ diabetes providers should be enhanced to ensure effective co-ordination of care
- Health professionals should practise to the top of their scope of practice as per the Health Practitioners Competency Assurance Act.

2.1 **Primary Health Care**
- Primary health care teams should receive appropriate training and support, and should be sufficiently experienced to deliver high quality care to the increasing diabetes population
- Primary health care teams should be configured to provide structured team based long term condition care which will include:
  - Co-ordination of all components of care
  - A comprehensive ‘free’ annual diabetes review for all patients with diabetes
  - Adequately funded time to provide full assessment, education and ongoing monitoring of people with type 2 diabetes
  - Whanau ora models of care are applied in practice

2.2 **Acute and specialist services**
- Specialist interdisciplinary teams should focus on patients with more complex health care needs e.g. vascular disease, renal disease
- Specialist expertise should support primary health care through funded workforce development and mentoring
- Specialist services should be responsive to community need and delivered in the most appropriate and cost effective manner. This may include multifaceted outreach services\(^2\) in rural and disadvantaged areas in particular (currently being trialled in an HRC funded integrated secondary specialist service in primary care project in Porirua).

2.3 **Retinal Screening**
- A well organised nationally co-ordinated retinal screening programme should be implemented and monitored
- Retinal photo quality assurance programmes should be implemented
- Accredited photo screening and photo grading training programmes should be developed

\(^2\) **Multi-faceted outreach services** provide opportunities for enhanced collaboration with primary health care practitioners, case review, joint consultations, situated learning experiences and seminars or other educational sessions (Gruen, Weeramantri, Knight, & Bailie, 2003)
2.4 Renal services

- Early proactive intervention on blood pressure, microalbuminuria, lipid and glycaemic control should be carried out in primary care
- Specialist nurse clinics and outreach nephrology clinics with emphasis on diabetic renal disease should be established
- Additional emphasis should be given to young patients and ethnic groups that are most severely affected by diabetic renal disease

3. Information technology to support service delivery

Adequate and appropriate information systems are a prerequisite to supporting an integrated model of care, therefore the National IT Board Information Technology plan recommendations are in place and electronic shared care is a reality:

- There should be an efficient electronic information sharing interface between primary health care providers and acute and specialist services at the local level to facilitate delivery of high quality services without unnecessary duplication
- All diabetes health care providers should be able to access appropriate levels of information to support care delivery, including, residential care, intellectual disability, renal services, etc
- People with diabetes are encouraged and enabled to fully participate in their care e.g. via patient portal system
- IT systems all use the same medical terminology coding system e.g. SNOMED-CT, the most comprehensive clinical terminology available
- Diabetes health providers should have access to contemporary guidelines, protocols, clinical decision aids and service directories for diabetes service providers and consumers e.g. Map of Medicine
- Patient data are linked through a common identifier to facilitate regional and national monitoring and evaluation.

4. Targeted investment in workforce training and development

- Role delineation should be clear so that diabetes education and training can be appropriately targeted
- All diabetes health care providers, both professionals and non-regulated health workers, should receive appropriate ongoing education and training from an accredited education provider
- Agreed national curriculum and standards should be developed for the delivery of education and training
- The National Diabetes Nursing Knowledge and Skills Framework (NDNKSF) should be utilised as a foundational document to guide curriculum development for all other disciplines
- Ongoing education updates should be a requirement for the delivery of diabetes services
- Informational competency to ensure that health professionals can effectively utilise IT systems should be developed and/or enhanced
• Diabetes healthcare professionals should be trained and supported to enable them to deliver emotional and psychological support themselves, at an appropriate level, with the aim of embedding this as an integral part of healthcare professional training for the future.
• Cultural competency should be demonstrated by outcomes measures.
• Mentor programmes such as Te Ohu Rata o Aotearoa aimed at increasing the number of Maori specialists should be supported.
• A structured clinically focused nurse practitioner training programme should be implemented.

5. People with diabetes
• People with diabetes should have access to quality assured evidence-informed self-management education.
• A stock take of programmes currently provided should be conducted and effectiveness evaluated.
• Structured diabetes self-management education for patients should be provided by those with appropriate training and expertise and in an appropriate setting.
• Patient education programmes should meet the five key criteria recommended by the Department of Health and the Diabetes UK Patient Education Working Group (2005).

6. Quality Improvement and Assurance
• Quality assurance will underpin all aspects of diabetes service delivery, including education programmes and retinal photo screening. Each component will be expected to have its own specific quality assurance programme.
• Key national monitoring indicators should be developed to facilitate nationwide monitoring of the quality of service provision and the diabetes epidemic.

7. National oversight and diabetes monitoring
• An independent appropriately skilled multidisciplinary group (including patient representation) should be established and funded to oversee workforce development, and to monitor diabetes service delivery and the diabetes epidemic. Such a group could be established and facilitated by the New Zealand Society for the Study of Diabetes (NZSSD) supported by a Maori advisory group and Diabetes New Zealand. In addition, their remit could include the following:
  o Endorsement of knowledge and skill frameworks and education and training programmes.
  o Support of basic and clinical research in diabetes.
  o Reporting outcomes which advance the reduction of inequalities as a target.
  o Development of a national curriculum for structured patient education.
1. Introduction

The aim of the Diabetes service workforce review was to develop:

- A vision of the diabetes care service and workforce for 2020
- A model of care for the diabetes care workforce that is patient-centred, team based and incorporates primary health care where appropriate.

The review was conducted in the context of increasing demand for diabetes care services across the health continuum and limited funding. A review team was brought together for the review (Appendix B) that was to be completed in a sixteen-week period.

The review was completed in May 2011 and was informed by literature, diabetes care service and workforce data, population and forecasting data, patient experience in diabetes care, and also innovations that are occurring in diabetes care services in New Zealand. This report is the output of the review and written for Health Workforce New Zealand.

The report is based on foundational principles such as:

- The person with diabetes (and their whanau) is central and is empowered to participate
- There is a focus on reducing disparities
- There is a focus on prevention of both diabetes and its complications to limit the increasing demand for diabetes services
- There will be a connected health community with a shared health record
- The national IT Board’s model of integrated health care will be embedded with one health record for one patient
- Health professionals will practice to their full potential and to the top of their scope of practice across the health continuum, thereby minimising duplication of services and maximising care delivery
2. Population trends and diabetes care needs

This section provides the context for considering future diabetes care needs, to inform future service and workforce requirements to effectively meet the demand.

Diabetes prevalence is increasing in New Zealand at a mean rate of 8-9% compounded per annum. Diabetes is a high priority for the Ministry of Health.

- In 2011, the estimated number of people with diabetes is 237156 and is estimated to increase by 50% over by 2021 without effective prevention programmes (Jo, Tobias & Yeh, 2011) (Appendix C)
- Diabetes prevalence is higher among Maori (5-10%), Pacific (4-8%) and Asian Indian (4%) populations compared with New Zealanders of European descent (3%) (MoH, 2008).
- Diabetes incidence rates are expected to increase 1.5% per year (reflecting obesity epidemic)
- About 90% of those with diabetes have type 2 diabetes (T2DM), but the prevalence of both type 1 diabetes (T1DM) (Appendix E) and gestational diabetes (GDM) is also increasing
- Type 2 diabetes is increasingly being diagnosed at younger ages, even in childhood
- Mortality is expected to decrease at a faster rate among people with diabetes than people without diabetes due to the better management of diabetes (Jo, Tobias & Yeh, 2011)
- Government health spending to treat type 2 diabetes could increase to approximately $1,600 - $1,800 million per annum by 2020 (2006 dollars), in the absence of any further prevention initiatives (Price WaterHouseCoopers, 2007)
- If resources required to provide health services to people with type 2 diabetes rise to the level indicated above, diabetes treatment costs will represent approximately 15% of Vote Health (compared to 3% of Vote Health in 2006), potentially crowding out other government funded health treatments and services (Price WaterHouseCoopers, 2007).

2.1 Sector activity

The Ministry of Health and District Health Boards have a joint work programme for diabetes and cardiovascular disease quality improvement, led by a steering group. The programme continues the work started under the framework of the *Diabetes and Cardiovascular Disease Quality Improvement Plan 2008* (QIP). The group coordinates the implementation of the Diabetes/Cardiovascular quality improvement initiatives. The programme includes a number of interrelated projects managed in groups according to the goals of the QIP. Four examples of progress on the recommendations in the QIP are:

- the registered nurse practising in diabetes health prescribing demonstration project
the New Zealand Guidelines Group - new treatment algorithms
translational research
projects targeting kidney disease.

The registered nurse practising in diabetes health prescribing demonstration project is sponsored by HWNZ with two priority aims:

• to demonstrate that diabetes nurse prescribing is safe within the registered nurses’ scope of practice, and
• to identify any implementation issues for wider roll out in the future

Four demonstration sites are underway and will be evaluated in October 2011 following which nurse prescribing in diabetes care is expected to be more widely implemented.

The New Zealand Guideline Group (NZGG) reviewed and updated the national diabetes clinical management guidelines in 2010/11. An implementation plan has been developed.

Diabetes research
Diabetes research including translation diabetes research, is occurring throughout the country. Examples of translation research projects either recently completed or in progress include:

• ‘Integrated Secondary Specialist Service in Primary Care for Diabetes Management’ being undertaken in Porirua
• ‘NZ Group-based Self-Management Education for Patients / Whanau with Type 2 Diabetes’ being undertaken in Wellington and North Otago
• ‘Factors affecting effective implementation of the National Diabetes Retinal Screening Grading System and referral guidelines: A multi centre analysis’
• DIPLoS: Reducing Diabetes Length of Stay and improving quality of care for inpatients with diabetes, being undertaken in MidCentral Health, Auckland and Rotorua.

Kidney disease
Focusing on improving detection and managing kidney disease, four district health boards (DHBs) are testing new ways of treating kidney disease. Two centres will use one approach, which is a world-class new electronic decision support tool for general practitioners, to improve detection and management of kidney disease. The second approach also involves general practitioners, and sees specialists working alongside primary care teams managing high risk kidney patients in the community.

Three related projects will also add to the evidence base, the successful Horowhenua Kidney Health project, and an established programme in Auckland DHB and a new programme just launched in Waikato DHB. It is expected that the projects will lead to similar programmes being rolled out throughout the country.
3. Diabetes care demand

Diabetes has no boundaries. It is a complex multisystem metabolic disease affecting all age groups. In addition, co-existent medical conditions (and/or their therapies) either lead to or exacerbate metabolic disturbance, such as steroid therapy in asthma or cancer. The number of people with diabetes requiring care will continue to rise across all health care settings for the foreseeable future. Figure 1 shows the spectrum of clinical diabetes from uncomplicated type 2 diabetes to highly complex diabetes with multiple system complications. With increasing longevity, duration of disease, and inadequate management, the risk of complications increases. Subsequently diabetes management increases in complexity both for the person with diabetes and for health professionals providing care and different expertise is required at different points of diabetes care services.

![The pyramid or spectrum of diabetes](image)

*Figure 1. The pyramid or spectrum of diabetes*

Due to improved care provision, novel therapies, advancing technologies and improved management of diabetes, life expectancy for the person with diabetes has increased. Therefore, New Zealand is faced with not only increasing numbers of people developing diabetes, but also more people with diabetes living longer, leading to a significant change in case mix (Figure 2).
For example, people with diabetes in the past were more likely to experience a fatal myocardial infarction (MI), whereas now, more people are surviving (i.e. non fatal MIs) with mortality rates among under-75s decreasing by 47% since 1995–97 (United Kingdom Department of Health, 2009). While this is a great achievement, the resultant increased morbidity and complexity will contribute to added pressures on health services across the spectrum of providers, and in particular specialist services. The predicted increase in diabetes prevalence (increasing by 8-9% compounded per annum) is likely to continue in the medium to long term even with control of the obesity epidemic, as only one third of the epidemic is associated with obesity (MoH, QIP, 2008). Appropriate expertise will be required for all types of diabetes (mostly type 1, type 2 and gestational) now and into the future, and different expertise will be required to meet the complex demands.

**Pre-diabetes**

People with asymptomatic ‘pre-diabetes’ clinical entities, impaired glucose tolerance (IGT) and impaired fasting glucose (IFG), and those with well defined diabetes risk factors also have specific health care needs, in order to prevent progression to diabetes. World renowned trials have clearly demonstrated progression to diabetes can be halted or delayed with appropriate support and lifestyle advice (Knowler, et al, 2002; Kosaka, Noda & Kuzuya, 2005; Pan, et al. 1997; Tuomilehto, et al. 2001).
4. Diabetes care services – identifying gaps and needs

4.1 Diabetes awareness and prevention

Type 2 diabetes can be prevented or delayed in many people, and its complications can be avoided or delayed (Diabetes Prevention Project Research Group, 2009), the escalating health and financial costs of the diabetes epidemic requires much greater investment in diabetes awareness and prevention. In particular improved cohesion and consistency between government departments and non-government organisations (NGOs) would enhance successfulness of current programmes.

4.2 Structured management

Well conducted clinical trials have demonstrated that optimising blood glucose control, and achieving blood pressure and lipid targets can prevent and/or slow the progression of macrovascular and microvascular complications of both type 1 and type 2 diabetes (DCCT, 1993; Heart Protection Study Collaborative Group, 2002; Pyorala, et al. 1997; UKPDS, 1998a; UKPDS, 1998b). Structured organised management of diabetes is considered necessary for optimising care and demonstrating improvement in patient outcomes (Griffin, 1998). The Otago Diabetes Project (Coppell, Anderson, Williams, Manning & Mann, 2006), the South Auckland Diabetes Project, and subsequent nationwide Annual Get Checked programme Smith, et al. 2011) have gone some way towards improved quality of care in general practice. However, variations in care delivery and outcomes persist (Joshy, Lawrenson, Simmons, 2008). In many instances, general practice continues to suffer from the ‘tyranny of the urgent’ (Bodenheimer, Wagner, & Grumbach, 2002) where acute care demands place pressure on time. Furthermore, the predominant business model does not promote the provision of structured long term condition care (Carryer, Snell, Perry, Hunt & Blakey, 2008) which is required to optimise management and retard disease progression.

4.3 Inconsistent education to people with diabetes

Across New Zealand, the education provided to people with diabetes varies considerably. Inconsistent or conflicting information or advice may potentially disadvantage many.

4.4 Lack of co-ordination

There is a lack of co-ordination of the large number of organisations and individuals providing community based services. Robust collaborative planning, coordination and quality monitoring of service delivery does not occur consistently potentially leading to delays in care and duplication of services.
4.5 Effective partnerships

Given the complex nature of diabetes, even with increasing support for people to undertake self-management of their diabetes, many will still develop complications or problems requiring ambulatory or inpatient specialist care. Partnerships between people with diabetes and clinicians, and between primary health and acute and specialist services, are critical to supporting people with diabetes to undertake self-care as well as they can.

4.6 Effective communication/electronic communication

Lack of communication between service providers causes inefficiency, duplication of services, errors and reduced quality of care. Communication (either electronic or paper based) between the many different diabetes health care providers can be inconsistent or nonexistent. Nursing care provided over the telephone, predominantly for regular assessment of effectiveness of treatment changes, is not currently funded.

4.7 Information technology support

Adequate and appropriate information systems are a prerequisite to supporting an integrated model of care. A comprehensive electronic register and clinical database supporting the integrated care of everyone with diabetes in New Zealand is absent. People with diabetes have a limited ability to communicate their results or monitor trends electronically. Ready access to guidelines, protocols, decision aids and service directories for diabetes service providers and consumers need to be improved.

4.8 Lack of data repository

Systematic collection of meaningful data to guide quality assurance of service delivery/provider initiatives is absent. Therefore, monitoring the epidemic systematically and informing decision-making around ongoing planning and funding of services is not evidence informed.

4.9 Adequate knowledge and skill

Inconsistencies exist in health professional knowledge and skill in managing and treating diabetes effectively. Many emergency department attendances and hospital admissions can be prevented if people with diabetes and their health care providers have adequate knowledge and support to manage diabetes during metabolic upsets and acute illness. There are no standards or consistent approaches to prepare or deploy unregulated health care workers to provide services to people with diabetes.
4.10 **Active succession planning for all disciplines involved in diabetes services**

Expertise required to deliver high quality care develops over time and with ongoing exposure to challenging clinical scenarios. Many of these experienced diabetes professionals are in the latter part of their career. There are limited or no training positions or resource mentors for future diabetes workforce across the core disciplines of medicine, nursing, dietetics and podiatry.

4.11 **Diabetic renal disease**

Diabetic renal disease is currently one of the fastest growing health care expenditures for secondary complications in people with diabetes. In New Zealand we are especially concerned about young pacific island and Maori patients who have significantly higher incidences of dialysis and rates of renal admission and renal death (ESRD **46-fold**, renal admission - **seven-fold** and renal death **four-fold** higher, Joshy, et al. (2009). Advancing renal failure is partly preventable or can be delayed if meticulous control of blood pressure and microalbuminuria are instituted early on (Goede, Tarnav, Vedel, Parving, & Pedersen, 2004). However, significant deficiencies exist in awareness and institution of intervention in primary health care. The provision of funding structures and workforce allocation that focus on prevention and early intervention will be essential in order to avoid expensive treatment of advanced and irreversible disease.

4.12 **Lower limb injury and amputation**

The cost of non-traumatic amputation both in human and economic expense is high and often avoidable. Amputation is one of the most costly aspects of diabetes with high personal and family/whanau costs, significant societal and benefit costs and with long hospital stays. Something as simple as daily foot inspections and early interventions as part of integrated podiatry care programmes have been shown to improve outcomes for people with diabetes related foot complications, with up to an 80% reduction in amputations in some cases.

Lowering amputation rates is not achievable solely by providing high levels of service. It is necessary to ensure that people have access to the appropriate level of expertise corresponding with the level of risk in a timely manner in order to prevent and treat early foot complications. Despite this knowledge, structured and publically funded podiatry programmes for people with diabetes with identified risk factors are not universally available in New Zealand.

4.13 **Maori workforce**

There is currently a significant shortage of Maori health professionals – a situation which requires investment and strengthening. For example, among
69 nurse practitioners, only 6.3% are active Maori registered nurses (NCNZ, 2010).

In 2007 Raurunga Raupa described the proportion of different health professional groups who identified as Maori: medical practitioners 3.0%, dietitians 3.1%, midwives 4.2%, psychologist 3.9%, podiatrists 3.0%, optometrists 0.7% (Ratima, Brown & Garrett, 2007).

4.14 Hospital inpatient diabetes management

The Quality Improvement Plan (MoH, 2008) identified people with diabetes tend to have more hospital admissions, stay longer and are more likely to be readmitted than those without diabetes. Inpatient costs for diabetes is high. For example, in the 2005/06 financial year there were 778 hospital admissions for diabetic ketoacidosis (DKA), which cost over $2 million. DKA admissions had increased by 25 percent over the five previous years.

There is good evidence of improvement in care and of reduced readmissions, with use of diabetes inpatient specialist nurses (Cavan, Hamilton, Everett & Kerr, 2001; Flannagan, Moore, Baker, Wright & Lynch, 2008) however, few New Zealand District Health Boards provide adequate dedicated diabetes nurse specialist inpatient diabetes services (Giles & Drury, 2009). Reducing length of stay, and improving quality of care for inpatients with diabetes, is currently the subject of a Health Research Council translational research project, trialing three different models of care in New Zealand hospitals, with results expected to be published in the near future.

4.15 Co-morbid conditions

People with diabetes not only develop diabetes complications but frequently have other co-morbid conditions such as respiratory problems or mental health conditions, that may further complicate their diabetes management. For example, steroids for respiratory exacerbations increase blood glucose. Good diabetes management when hospitalised for another condition can be less than optimal. Awareness and knowledge of the impact of other conditions on diabetes needs to be improved.
5. Diabetes care scenarios

Diabetes care in New Zealand is provided in a variety of settings across the health continuum including for example, primary health care, general practice teams, hospitals and specialist outpatient departments, residential care, kindergartens, schools and workplaces. Three scenarios have been developed (adapted from Diabetes UK) depicting present care pathways. With the growing demand the review group did not foresee the ‘what’ and the ‘who’ changing significantly in 2020 but there will be changes in the ‘how’.

Some key changes which are to be considered as underlying assumptions for all three scenarios include:

- Primary prevention will be led by public health teams and primary health care services working collaboratively
- People with diabetes will play an increased role in the management of their condition/s and they will have access to evidence-informed electronic tools and clinical services in which they are considered central and feel empowered to participate
- Through active partnerships, people with diabetes and their whanau will be supported to meet their specific health needs and wellbeing through delivery of care that is both culturally appropriate and culturally responsive
- Health literacy will be enhanced
- Advanced care planning will be embedded
- The use of information technology will support people with diabetes to participate to their fullest potential (e.g. the patient portal, decision support tools in their monitoring systems), and to support clinicians in the delivery of co-ordinated services
- Information technology will be embedded and telemedicine will support clinical consultations and decision-making
- Integrated information technology systems, using a common language will be in place so that patient data is accessible by all providers across primary health care, and acute and specialist services at the local level
- Services will be more mobile and more care will be provided remotely using electronic means of communications
- Registered nurses, dietitians and podiatrists will be prescribing leading to a redefinition of roles and responsibilities
- Nurse practitioners and registered nurses will provide the majority of diabetes and long term condition care
- The emphasis within each of the scenarios is on collaborative partnerships between different providers, and between providers and people with diabetes
- Duplication of care and documentation is reduced
- Funding models will keep abreast of technology, changing care delivery models, technological advances and value outcomes rather than solely volumes
- There will be a recognition of the requirement for expanding volumes in specialist services as the complexity increases
- There will be regional hubs for training and advancing practice
Scenario one
Scenario one (Appendix C) focuses on type 2 diabetes. In this scenario there is an emphasis on primary prevention led by public health teams and primary health care services working collaboratively. Once a person is diagnosed with diabetes, multidisciplinary teams consisting of general practitioners, practice nurses (some with specialty knowledge of diabetes), primary health care nurse practitioners, dietitians, podiatrists, and others provide structured systematic care. A comprehensive annual diabetes review is routinely undertaken by health professionals with the appropriate knowledge and skill, to ensure a systematic screen for risk factors and complications of diabetes and cardiovascular disease. The person with diabetes is central to his/her care and will be continuously involved in care planning and management decisions. Practice nurses have funded adequate time to provide full assessment, education and ongoing monitoring of people with type 2 diabetes. This may be face to face or via technological means. People with diabetes will be actively monitoring and trending their results, and utilising on-line decision support tools to assist them and their whanau to work within treatment guidelines. The general practice team will be alerted when programmed ‘at risk indicators’ are consistently triggered.

The majority of care for the adult with type 2 diabetes occurs in primary health care with episodic care provided by hospital based multidisciplinary specialist services consisting of endocrinologist or diabetologist, nurse practitioners leading teams of clinical nurse specialists, and dietitians, podiatrists and psychologists. Effective retinal screening programmes will be in place and accessible to all people with diabetes. Technology will enable people with diabetes to have virtual exams. Other specialty clinicians are consulted or referred to in response to the medical needs of the person with diabetes. With general practice as the co-ordinating hub, services will act in concert to achieve an integrated service for the person with diabetes with discharge back to general practice teams once stabilised for ongoing care. Specialist oversight may continue as required. Palliative care services are engaged at the appropriate stage and advanced care planning is embedded.

Scenario two
In scenario two (Appendix D) children with diabetes are predominantly cared for by hospital based specialist multidisciplinary paediatric teams consisting of a minimum of paediatrician, diabetes clinical nurse specialist and/or nurse practitioner, specialist dietitian, and psychologists adequately supported by administrative staff. Partnerships with primary health care providers are essential as they continue to provide care related to structured/systematic care and for other aspects of the child's health. Caring for a child with diabetes almost always involves providing care to the family so it is important to have clinicians who understand developmental stages and are skilled in working with families. Adult diabetes physicians and diabetes clinical nurse specialists become involved in care at the time of transitioning from children to adolescent or adult services. This should be a seamless transfer of care at what is potentially a vulnerable time for young people. Real time on-line
shared care plans will be in place with pre-set parameters for routine problems. Children with diabetes will also access other services in response to specific events that occur and may require hospitalisation, or other specialist services for either episodic or ongoing care.

Scenario three
In scenario three (Appendix E), the diabetes care pathway for type 1 diabetes, the emphasis is on diabetes care being led and provided by specialist services particularly in the first month and year following diagnosis. On an ongoing basis specialist oversight is required but the majority of care may be provided in general practice with support from specialist services. Those with type 1 diabetes require long term care by a specialist multidisciplinary team with specific skills in managing all aspects of type 1 diabetes and its complications. Much of this care may be provided by nurse practitioners, specialist diabetes nurses and dietitians with expertise in type 1 diabetes and its complications. Other services will be required as the disease progresses and complications ensue, or for episodic care such as hospital admissions, travel plans, investigative procedure plans. Palliative care services are engaged at the appropriate stage and advanced care planning is embedded.

An additional consideration: Diabetes in pregnancy

Women with type 1 or type 2 diabetes require preconception care and once pregnant, require care from a specialist multidisciplinary team consisting of a minimum of an obstetrician, midwife, diabetes physician, diabetes clinical nurse specialist and/or diabetes nurse practitioner and specialist dietitian.

Midwives will have an increased role in caring for women with gestational diabetes, with access to specialist nursing, medical and dietetic advice as required. Whilst not included in any of the scenarios, the American Diabetes Association, the International Diabetes Federation and the Australasian Diabetes in Pregnancy Society are recommending the criteria for diagnosis of gestational diabetes to change, lowering the threshold for diagnosis. However, the New Zealand Society for the Study of Diabetes (NZSSD) believes the evidence does not wholly support such a change. According to Professor Tim Cundy, the Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) data did not provide compelling reasons for reducing the diagnostic thresholds for gestational diabetes (Cundy, 2008). Furthermore, NZSSD has expressed concerns about the resultant significant increase in demand which would pose an enormous burden on already stretched obstetric, midwifery, diabetes specialist medical, nursing and dietetic services and inpatient services, with no demonstrated benefit.
6. Diabetes care workforce

People with diabetes have differing health care needs relating to their diabetes such as: risk reduction, early identification and diagnosis of their diabetes, ongoing predictable health needs, being at high risk for disease progression and complication development, and experience of medically, emotionally and socially complex problems (Diabetes Knowledge and Skills Framework, 2009). The diabetes workforce comprises a large multidisciplinary team spanning the health continuum and service providers such as:

- Practice nurses
- Primary health care Nurse Practitioners
- General practitioners
- Primary health care nurses (e.g. prison occupational health, residential care)
- Primary Health Organisation/Chronic care nurses
- Diabetes clinical nurse specialists
- Diabetes nurse practitioners
- Diabetes specialist physicians/Endocrinologists
- Paediatricians/Adolescent physicians
- Diabetes specialist dietitians
- Podiatrists
- Ophthalmologists/Optometrists/Retinal screening graders
- Obstetricians
- Midwives
- Health psychologists/Behavioural therapists
- Researchers and scientists
- Community Pharmacists
- Physiotherapists/ Physical activity therapists
- Smoking cessation co-ordinators
- Unregulated health workers/Community health workers

As diabetes occurs across the lifespan and concomitantly with many other conditions, multiple services may be required at different times or at the same time, such as (but not limited to):

- Cardiology
- Dental
- Gastroenterology
- Gerontology
- Neurology
- Pain management
- Palliative care
- Radiology
- Renal
- Respiratory
- Social work services
• Surgical services

Therefore, diabetes services should be structured to provide care in a collaborative and co-ordinated way while striving to maintain continuity of care where possible.

6.1 NZSSD Workforce Survey

In 2009 the New Zealand Society for the Study of Diabetes (NZSSD) conducted a workforce survey of diabetes specialist physicians and diabetes nurse specialists working in specialist (secondary care) services.

**NZSSD findings and recommendations:**

**Findings:**

1. There is significant variation in the provision of diabetes specialist physician, nursing, dietitian and podiatry services between DHBs
2. The national mean is 0.35 FTE **diabetes specialist physician** per 100,000 population
3. The total number of diabetes specialist physician FTE for New Zealand is 14.5
4. No DHB has a diabetes specialist physician service that is at or above that recommended by the Federation of the Royal College of Physicians of the United Kingdom (1 FTE per 125,000 or 0.8 FTE per 100,000)
5. New Zealand requires 19.4 more diabetes specialist physician FTEs to meet recommended numbers
6. The national mean is 2.79 FTE **diabetes nurse specialist** per 100,000 population, with a national range is 1.08 to 4.87 per 100,000 population.
7. The national range of **diabetes specialist dietitians** is 0 – 3.17 FTE per 100,000 population
8. The national range of **diabetes specialist podiatrists** is 0 – 1.19 FTE per 100,000 population.

**Recommendations:**

1. The Minister of Health should be informed of the inadequate and inequitable provision of diabetes specialist services in New Zealand
2. A nationally agreed target for Diabetes Specialist Services should be established to reduce the inequity in service provision between DHBs
3. DHBs should be instructed to meet this target within a reasonable timeframe, e.g. 5 years
4. Diabetes should be recognised as an under-resourced discipline and incentives be developed for doctors to train in this discipline.
7. Diabetes Care workforce and training issues

7.1 Workforce

7.1.1 Nursing

The magnitude of the gap between recommended best practice and current practice in diabetes care in New Zealand is not well defined. However, current national patient clinical indicator data demonstrate diabetes care could be significantly improved (Health Improvement Innovation Centre). Nurses are the largest health workforce group and they play an important role in diabetes care and education. Patients’ knowledge and understanding of their diabetes and its management depends, to a large extent, on the adequacy and effectiveness of diabetes-related instructions they receive. A major prerequisite for nurses to provide contemporary diabetes care and education, wherever they practice, is a fundamental level of knowledge, competence and confidence. The subsequent application of this knowledge should promote the provision of consistent evidenced-based practice, contributing to improved health outcomes.

Nurses practising in primary health care will provide the bulk of care for people with type 2 diabetes who have relatively stable health but are at high risk for disease progression and complication development. They therefore are required to have a particular level of capability in diabetes nursing care. Specialist diabetes nurses require advanced knowledge and skills in diabetes care as their practice requires them to respond to people with diabetes who have increasing challenging and complex medical and health care needs requiring episodic care or longer-term oversight of their diabetes management. The different level of knowledge and skills required by nurses providing diabetes care across the spectrum of diabetes care is articulated in the National Diabetes Nursing Knowledge and Skills Framework (2009) and is illustrated below.
Education and training within the specialty of diabetes is inconsistent for nurses but possibly the most organised compared to other disciplines within diabetes. Some specific diabetes courses are offered from tertiary education institutions with good examples being the Universal College of Learning’s (UCOL) (Palmerston North) level 7 post registration paper Nursing the Person with Diabetes; and the Waikato Institute of Technology’s (WINTEC) (Waikato) level 7 post registration and level 8 postgraduate paper Advanced Diabetes Nursing. These three papers’ curriculums are based on the NDNKSF at level 2 and level 3 respectively. Both work in partnership with the local specialist service to deliver and quality assure the paper content.

An excellent example of workforce development focusing on enhancing general practice teams’ capabilities to provide diabetes care can be found in Hutt Valley Health District Health Board. Hutt Valley Health’s programme ‘Diabetes Action’ is a collaborative programme, funded by the DHB, between a local PHO and the specialist diabetes service. Practice nurses attend a two day education programme provided by the specialist nursing team and then become certified to provide care to people with type 2 diabetes. That practice is then funded to provide people with diabetes with three additional free visits to provide follow up on care planning, assessment of progress and ongoing diabetes education. Additional multidisciplinary workshops are provided by the endocrinologist and specialist nursing team on insulin management. Following attendance, general practice teams are encouraged to commence insulin in people with type 2 diabetes in collaboration with the specialist service. In particular the practice nurses are supported by the local clinical nurse specialists through telephone liaison, joint consultations and yearly update sessions.

7.1.2 Nurse Practitioners

The current pathway to become registered as a nurse practitioner is rigorous and relatively long. The Nurse Practitioner Advisory Committee of New Zealand has developed a proposed Nurse Practitioner (NP) training and education programme to provide a more structured and clinically focused approach to gaining NP registration in a shorter time frame. Nurse practitioners have immense potential to fill health service gaps across the health continuum through their advanced clinical capability of:

- independently making medical diagnoses
- prescribing a wide range of medicines
- clinical leadership skills to lead specialty nursing teams across the continuum.

Therefore support of a structured clinically focussed training programme is highly recommended.

7.1.3 Registered Nurses

Registered nurses play a key role in diabetes care, providing the largest workforce group in both primary health care and specialist services. In particular, clinical nurse specialists have usually undertaken extensive training
within the specialty of diabetes and are able to practice at an advanced practice level. They are usually accredited through the Diabetes Nurse Specialist section of NZNO and are required to meet Specialist level on the National Diabetes Nursing Knowledge and Skills Framework. With the recent change in legislation to allow registered nurses practising in diabetes health to prescribe a limited range of diabetes related medicines and devices, registered nurses, in particular clinical nurse specialists have a huge potential to improve health outcomes into the future. Their potential lies in the ability to provide direct clinical services and to support primary health care nurses and medical practitioners to provide high quality primary and secondary prevention care.

7.1.4 Medical practitioners

Medical practitioners delivering diabetes care will be general practitioners, general physicians/internists and specialist endocrinologists/diabetologists; however the majority of diabetes related work will be delivered within primary health care. The registration with the Medical Council of New Zealand (vocational and general) covers this scope. The increase in more complex diabetic patients, as well as the expected improvement of quality of care requires enhanced continuous professional development for medical providers that currently have less exposure to diabetic patients. Additional curriculum based training towards sub-specialist interests in diabetes management at primary health care level (GP’s with special interests) is encouraged. The development of larger primary health care centres would facilitate the development of specialist interests within a GP practice and the provision of higher quality diabetes care in the primary health care setting.

Due to the increase in number of diabetes related hospital admissions and inpatients that have diabetes or diabetes related complications, the focus of specialist’s endocrinologists/physicians work will shift more towards inpatient diabetes management and advice. In addition the management of complex and advanced diabetic patients as well as certain groups of diabetic patients (pregnancy, childhood, adolescence and type 1 diabetes) will remain the domain of specialist services. Outreach clinics, e-learning, telephone and electronic advice as well as clear referral pathways between hospital and community services will be required.

The pivotal important collegial professional relationship between medical practitioners in primary and secondary care should be reflected in DHB and PHO organisational and funding structures for the delivery of diabetes care.

The role of the specialist physician in the future will require the development of extended managerial leadership skills, as well as knowledge in adult education and mentoring.

A persistent shortage of diabetes specialist physicians, especially in rural areas, will require attention to recruitment and retention, as well as to encouraging trainees into the speciality.
7.1.5 Dietitians

Registered dietitians are a key part of the healthcare team. Registered dietitians are uniquely qualified to use effective nutritional management strategies, based upon current scientific evidence, to help individuals or groups to improve their health.

Dietitians are required to meet the standards of professionalism required by the New Zealand Dietitians Board under the Health Practitioners Competence Assurance Act, HPCA Act (2003). Dietitians work within a specific Scope of Practice, adhere to a Code of Ethics, meet registration competency requirements, participate in continuing competency programme and undergo regular auditing in order to maintain their practising certificate and be able to legally call themselves a New Zealand registered dietitian. Nutritionists however, do not have the same calibre and do not have a governing body nor a scope of practice that adheres to a code of ethics.

Education and training within the specialty of diabetes is inconsistent for dietitians as an integrated career and competency framework for dietitians has not been completed. Some specific diabetes courses are offered for dietitians from tertiary education institutions with good examples being:

- a five day Melbourne course at Deakin University
- WINTEC’s (Waikato) level 8 postgraduate paper Advanced Diabetes Nursing, and
- University of Otago’s Masters in Dietetics (endorsed in Diabetes) from 2013.

From 1st April 2011, Dietitians have the right to independently prescribe Special Foods after the medical diagnosis has been made. Dietitians are required to complete 15hrs online (basis of prescribing practice and relevant therapeutic and pharmacokinetic considerations) prior to a one day workshop looking at clinical decision-making and prescribing practice.

Implementation of an integrated career and competency skills framework for New Zealand dietitians is planned. The University of Otago Master of Dietetics (MDiet) endorsed in Diabetes has been postponed until 2013 due to lack of interest and lack of study funds allocated for dietitians.

7.1.6 Podiatry

The recent increase in the prevalence of diabetes and foot related complications has increased the focus on the unique skill set that podiatrists can provide to help manage this preventable end stage complication of diabetes. These skills include non-invasive vascular assessment of the lower limb, sharp conservative wound debridement, the use of local anaesthesia and an intricate knowledge of the workings of the lower limb and foot.
The Podiatric workforce has historically been employed in private practice and continues as there is a low provision of funded podiatry services within New Zealand.

**Main Employment setting of Active Podiatrists (HWF Annual Survey summary results)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Private practice-self employed</td>
<td>112</td>
<td>116</td>
<td>108</td>
<td>97</td>
<td>123</td>
<td>113</td>
<td>125</td>
</tr>
<tr>
<td>Private practice - employed</td>
<td>38</td>
<td>33</td>
<td>24</td>
<td>23</td>
<td>22</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Hospital &amp; health service/DHB</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>University/ Polytechnic</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Private hospital/ rest home</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Not reported</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total surveyed</strong></td>
<td>177</td>
<td>174</td>
<td>155</td>
<td>152</td>
<td>173</td>
<td>166</td>
<td>173</td>
</tr>
<tr>
<td><strong>Total APCs</strong></td>
<td>305</td>
<td>298</td>
<td>273</td>
<td>259</td>
<td>273</td>
<td>245</td>
<td>245</td>
</tr>
</tbody>
</table>

In a 2008 review of secondary specialist podiatry services found a mean 0.3 FTE per 100,000 of population per DHB. Internationally evidence suggests that timely access to multidisciplinary foot teams improves outcomes for diabetic foot complications. The low provision of service presents a barrier to workforce development as there are no career pathways or employment opportunities that support advanced skill and knowledge acquisition.

At an undergraduate level the basic skills and knowledge relating to diabetic foot management are interwoven through the course content. In 2012 a new undergraduate paper called *Te Mate Huka: Diabetes Management in Aotearoa* will be introduced. This will focus learning on diabetes and associated pedal complications.

The regulatory authority for podiatrists requires all podiatrists to complete updates in wound care as part of their CME. Currently educational updates are provided through workshops and conferences on an adhoc basis with little or no assessment component. There is no formalised framework or pathway for capabilities and competency development. This is an issue for future workforce development that the professional body is addressing and the newly established Podiatry Special Interest Group within NZSSD. It will take a partnership approach between the education providers the regulatory body the profession and employers to reach a sustainable integrated solution.

Sustainable profession specific post graduate training for small professions such as podiatry is not feasible or desirable. Post graduate education needs to reflect contemporary diabetes interdisciplinary practice. A post graduate paper on the high risk foot is being developed through AUT. The paper will focus on the high risk foot including diabetes and be open to all interested professions. The paper could be offered as an optional paper to various post graduate pathways including primary care and podiatric prescribing.
7.2 Structured education for people with diabetes

There is increasing evidence of the effectiveness of structured diabetes education programmes and group education techniques, particularly for type 2 diabetes. There is good evidence that diabetes education provided in a structured manner supports self management and is effective for improving clinical outcomes and quality of life (Funnell, et al. 2007). According to the National Collaborating Centre for Chronic Conditions (2008) the aims of structured education and self-management programmes are to improve outcomes through:

- addressing the individual’s health beliefs
- optimising metabolic control,
- addressing cardiovascular risk factors (helping to reduce the risk of complications),
- facilitating behaviour change (such as increased physical activity),
- improving quality of life
- reducing depression.

An effective programme will also enhance the relationship between the person with diabetes and their healthcare professionals, thereby providing the basis of true partnership in diabetes management.

The success of a given education programme is largely dependent on the workforce most suitable to deliver that programme being adequately and appropriately supported.

Any patient education programme should meet five key criteria laid down by the Department of Health and the Diabetes UK Patient Education Working Group (2005):

- Programmes should be evidence-informed, and suit the needs of the individual. The programme should have specific aims and learning objectives. It should support the learner plus his or her family and carers in developing attitudes, beliefs, knowledge and skills to self-manage diabetes
- The programme should have a structured curriculum that is theory-driven, evidence-based and resource-effective, has supporting materials, and is written down
- The programme should be delivered by trained educators who have an understanding of educational theory appropriate to the age and needs of the learners, and who are trained and competent to deliver the principles and content of the programme
- The programme should be quality assured, and be reviewed by trained, competent, independent assessors who measure it against criteria that ensure consistency
- The outcomes from the programme should be regularly audited.
Equality and diversity considerations

It is recommended that a national curriculum for patient education be developed to be delivered using well-established approaches, but adapted to suit New Zealand community and cultural factors. All information about treatment and care, including a structured patient educational programme, should take into account age and social factors, language, accessibility, physical, sensory or learning difficulties, and should be ethnically and culturally appropriate. It should also be accessible to people who do not speak or read English. If needed, people with diabetes should have access to an interpreter or advocate.

A good example of a structured education programme is the Health Living Courses delivered by The Manawatu, Horowhenua, Tararua Diabetes Trust (MidCentral Health). The Healthy Living Course is delivered in a flexible modular format with people with diabetes and their whanau or support people, opting to attend all of the modules or just some. The modules cover the spectrum of aspects of diabetes care plus information on local services available and how to access them. The programme is quality assured by the local diabetes nurse practitioner and delivered by registered nurses and dietitians using the same resources to ensure consistency. The programme delivery is interactive and caters for varying levels of literacy. Pre and post knowledge and empowerment assessments are conducted with improvements demonstrated consistently. Participant satisfaction is also measured and is consistently high. The programme is delivered across the district improving access particularly in rural areas. In addition they are delivered across week days and weekends and during the day and evenings. The programme is delivered in a variety of community settings including Maori Health provider facilities, marae and churches.
8. Vision and model for diabetes care

The review team took the following into consideration in the development of the vision and diabetes care model:

- Scottish Tayside diabetes action plan values
- Western Australia Endocrine Health Network Diabetes Model of Care 2008
- New Zealand Primary Health Care Strategy
- National Health IT Plan draft for discussion (April 2010)
- Other contemporary literature
- Expert opinion

8.1 Vision

Vision: Diabetes health services in New Zealand will be high quality, patient-focused and integrated across the health continuum from prevention to tertiary care, thereby reducing the diabetes burden and enabling optimum health outcomes to be achieved for people with diabetes.

Thus, in 2020:

- The burden of disease and the number of people with diabetes will be decreasing as the result of effective diabetes prevention programmes
- People with diabetes will play an increased role in the management of their condition/s and will have access to evidence-informed clinical services in which they are considered central and feel empowered to participate
- Care will be consistent, based on evidence-informed guidelines and agreed standards
- Health care providers will utilise appropriate communication skills that are responsive to individuals with diabetes within consultations, and communicate effectively with other health care providers
- Effective collaborative partnerships between different providers, and between providers and people with diabetes will be the norm
- The use of information technology will support people with diabetes to participate to their fullest potential (e.g. the patient portal\(^3\)), and to support clinicians in the delivery of co-ordinated services
- Services will be more mobile and where appropriate more care will be provided remotely using electronic means of communications
- Information technology will be embedded and telemedicine will support clinical consultations and decision-making
- Integration of information technology systems will allow relevant patient data to be safely accessible by diabetes health service providers to reduce duplication of care and documentation

---

\(^3\) Patient portals are health-care related online applications that allow patients to interact and communicate with their health care providers.
• There will be a focus on reducing duplication and funding models will keep abreast of technology and changing care delivery models
• Funding models will focus on outcomes rather than volumes only
• There will be a recognition of the requirement for expanding volumes in specialist services as the complexity increases
• Accountability for delivery of services will be exercised through more robust contracting and funding processes

8.2 Model of care

The key objective of the diabetes model of care (Appendix I) is to ensure that diabetes services are optimally configured to:

• Prevent and delay the onset of diabetes
• Prevent and slow the progression of diabetic complications, especially heart disease, renal failure, impaired vision and lower limb amputations
• Improve the quality of life for people who have diabetes
• Reduce inequalities in diabetes service provision, particularly for Maori and Pacific people and other disadvantaged groups
• Improve communication between services to ensure appropriate and timely flow of information to support patient care delivery

Implementation of the diabetes model of care will assist service delivery and integration of diabetes services in the following ways:

• Increasing the capacity of primary health care coordinated multidisciplinary services to prevent and manage diabetes and its complications
• Developing an efficient interface between general practice and the diversity of community based diabetes prevention and management services at the local level, especially in under-resourced and high need locations
• Improving accessibility and quality of diabetes management education
• Ensure the right person delivers the right care in the right place at the right time
• Ensure practice is competency based across varied levels of practice
• Ensure competency is acquired through experiential (situated) learning
• Foster clinicians working in partnership with a collaborative multidisciplinary practice environment
• Promote collegial linkages between providers and community groups are maintained to meet health needs of community
• Enhancing service quality by increasing the use of guidelines, local protocols, service directories, registers, recall systems and patient held management plans to ensure that all people with diabetes receive comprehensive, ongoing care
• Improving local service coordination and increasing knowledge of available resources by health care providers and people with diabetes
• Improving access to and effectiveness of specialist services to address specific problems and refer back to general practice for long term management

The model of care for each stage of diabetes consists of the following components:

• Prevention and health promotion
• Primary health care coordinated multidisciplinary prevention and management, including targeted programmes for high risk and vulnerable groups
• Acute care and Specialist multidisciplinary team services
• National quality assurance and improvement oversight
• Information technology/support structures

8.3 Prevention and health promotion

Diabetes awareness and prevention services are provided by many organisations and individuals in the government, non-government and private sectors. Most have limited capacity and operate independently of each other and other diabetes services. There is a pressing need for a coordinated community services sector that is integrated with general practice to provide health promotion, risk assessment, diabetes prevention services and early diagnosis for diabetes and self-management education at the local level. Specific programmes are needed for prevention and early detection of diabetes in high risk and vulnerable groups who may not be seen in general practice. Lets Beat Diabetes (Counties Manukau) is a good example of such a programme.

8.4 Primary health care coordinated multidisciplinary prevention and management, including targeted programmes for high risk and vulnerable groups

Multidisciplinary primary health care needs to be supported to succeed with identification of at risk, early diagnosis, structured surveillance and proactive diabetes management for those with complex but stable health care needs

Primary health care services provide care for individuals with diabetes (including other specific types of diabetes) with stable health care needs and with those developing complexity. General practice will be configured to successfully co-ordinate structured long term condition care specifically through:

• A comprehensive annual diabetes review is routinely undertaken by health professionals with the appropriate knowledge and skill, to ensure a systematic screen for risk factors and complications of diabetes and cardiovascular disease
• The person with diabetes is central to his/her care and will be continuously involved in care planning and management decisions
• Practice nurses have funded adequate time to provide full assessment, education and ongoing monitoring of people with type 2 diabetes
• Information technology systems to support effective communication and shared records
• Effective partnerships with other providers to promote seamless care

8.5 Community based non clinical services

Community based non clinical services provide generic structured diabetes education care for individuals with type 2 diabetes with stable health needs and where appropriate their family members, and individuals with type 1 diabetes as agreed and supported by the local specialist diabetes service. Patient educational programmes will meet five key criteria laid down by the Department of Health and the Diabetes UK Patient Education Working Group (2005) as described earlier.

The programmes will take into account the needs of different population groups, which would assist with addressing national equity issues for Maori, Pacific Peoples and others. Utilising these criteria provides a degree of consistency of application while allowing for flexible delivery styles to meet specific local community needs.

8.6 Acute care and Specialist team services

Specialist multidisciplinary teams focus on those with more complex and challenging health care needs whilst supporting primary health care. They are responsive to community need and mobile through multifaceted outreach services to improve access in rural and disadvantaged areas. Multi-faceted outreach services provide opportunities for enhanced collaboration with primary health care practitioners, case review, joint consultations, situated learning experiences and seminars or other educational sessions. This type of service currently exists sporadically and is the subject of a Health Research Council funded study in Porirua.

Acute care and specialist team services focus on individuals with: type 1 diabetes, type 2 diabetes with advanced disease and significant co-morbidities, acute/chronic complications, multiple co-morbidities, complex therapies, end stage disease/palliation and where appropriate their family members. In addition, services are provided as part of other multidisciplinary teams for children/youth with diabetes, pregnancy care for women with gestational diabetes and pre-pregnancy, antenatal, intra-partum and post partum care for, women with pre-existing diabetes, inpatient hospital care, people undergoing investigate procedures or surgery and individuals with other specific types of diabetes.

People with established complications need timely access to appropriate GP and specialist management services. Proactive and coordinated specialist services focus on the integration of prevention and early intervention via a variety of avenues (primary health care education, supporting specialist nurse
clinics, guideline implementation) as well as dealing with advanced disease and complications.
Specialist podiatry and multidisciplinary high-risk foot services are highly effective in preventing ulceration and amputations. In people with advanced diabetic retinopathy, laser photocoagulation is highly effective in preventing vision loss.

Specialist medical, nursing and dietetic review is needed for people with inadequately controlled diabetes requiring intensive therapies including insulin, those with advanced diabetic complications and other complex medical problems. Most of these patients should be referred back to their GP once specific problems have been addressed and an appropriate management plan has been formulated.

People with diabetes and health professionals need adequate knowledge and skill for managing and treating metabolic upsets and acute illnesses. This is especially important for people with type 1 diabetes for whom timely advice and appropriate care can prevent potentially life threatening diabetic ketoacidosis. Ready access to high quality information is essential. People with diabetes should have an action plan for managing a decline in their health status, including when and how to seek professional advice. Timely telephone contact with a health professional skilled in managing acute illness in diabetes, such as a diabetes nurse specialist, is often able to avert progression to serious illness and hospital admission. Therefore local systems are need to ensure rapid access to specialist advice and assistance when needed.

Diabetes was the direct cause of 778 admissions for diabetic ketoacidosis in the 2005/06 financial year, and these admissions cost just over $2 million. Over the five previous years these admissions had increased by 25 percent. People with diabetes tend to have more hospital admissions, stay longer and cost more, and they are more likely to be readmitted. There is good evidence of improvement in many of these measures, and of reduced readmissions, with use of diabetes inpatient specialist nurses who can provide specific attention to improving inpatient care, discharge planning and effective follow-up to reduce readmission.

8.7 Information technology support

There is a need for readily accessible, concise decision aids dealing with diabetes prevention, early diagnosis and all aspects of initial and long term management including self-management. There is a pressing need to develop an efficient interface between general practice and community health services at the local level.
Systematic use of guidelines, local protocols, service directories, patient registers, recall systems and patient held management plans is needed to ensure that all people with diabetes receive comprehensive ongoing care. Proposed governmental or private IT service providers need to have their services:
- Piloted
- Evidence based and quality assured
- Good track record in successful implementation for other chronic care areas
- Aligned with national guidelines and skills framework

### 8.8 Quality Improvement and Assurance

Diabetes and related condition Clinical Governance Networks that are strong and effective in planning, integrating and coordinating local service delivery, overseeing service quality and research activities, and monitoring services and outcomes will be in place. They will be multiprofessional and membership will reflect the range of local and regional service providers. Consumers of care will have a key role to ensure services are planned and delivered to promote patient centredness. The Diabetes and related condition Clinical Governance Networks will have a mandate to determine service directions and delivery and will be responsible for a range of functions such as: planning and coordination, promoting integration of systems of care to reduce duplication and ensure seamlessness for the person with diabetes, robust audit and quality monitoring, oversight of local research activities. The networks will link in with the national oversight group to assure consistency, quality and equity.
9. Recommendations:

For all recommendations consideration must be given to culture, age, socioeconomic factors, language, health literacy, and accessibility.

9.1 Prevention and Health promotion
- A co-ordinated national population based diabetes prevention programme should be implemented to prevent or delay the onset of type 2 diabetes and its related conditions
- Primary health care services should actively identify and manage high risk individuals
- Health promotion programmes should be developed in partnership with communities and delivered by those with the most appropriate expertise (e.g. Ngati and Healthy, Let’s Beat Diabetes)

9.2 Service delivery
- Implementation of the recommendations in Cardiovascular and Diabetes Quality Improvement Plan should continue
- Funding models should support interdisciplinary care and innovative practice
- Communication between patients’ diabetes providers should be enhanced to ensure effective co-ordination of care
- Health professionals should practise to the top of their scope of practice as per the Health Practitioners Competency Assurance Act

9.2.1 Primary Health Care
- Primary health care teams should receive appropriate training and support, and should be sufficiently experienced to deliver high quality care to the increasing diabetes population
- Primary health care teams should be configured to provide structured team based long term condition care which will include:
  o Co-ordination of all components of care
  o A comprehensive ‘free’ annual diabetes review for all patients with diabetes
  o Adequately funded time to provide full assessment, education and ongoing monitoring of people with type 2 diabetes
  o Whanau ora models of care are applied in practice

9.2.2 Acute and specialist services
- Specialist interdisciplinary teams should focus on patients with more complex health care needs e.g. vascular disease, renal disease
- Specialist expertise should support primary health care through funded workforce development and mentoring
- Specialist services should be responsive to community need and delivered in the most appropriate and cost effective manner. This
may include multifaceted outreach services\(^4\) in rural and disadvantaged areas in particular (currently being trialled in an HRC funded integrated secondary specialist service in primary care project in Porirua).

9.2.3 Retinal Screening
- A well organised nationally co-ordinated retinal screening programme should be implemented and monitored
- Retinal photo quality assurance programmes should be implemented
- Accredited photo screening and photo grading training programmes should be developed

9.2.4 Renal services
- Early proactive intervention on blood pressure, microalbuminuria, lipid and glycaemic control should be carried out in primary care
- Specialist nurse clinics and outreach nephrology clinics with emphasis on diabetic renal disease should be established
- Additional emphasis should be given to young patients and ethnic groups that are most severely affected by diabetic renal disease

9.3 Information technology to support service delivery

Adequate and appropriate information systems are a prerequisite to supporting an integrated model of care, therefore the National IT Board Information Technology plan recommendations are in place and electronic shared care is a reality:

- There should be an efficient electronic information sharing interface between primary health care providers and acute and specialist services at the local level to facilitate delivery of high quality services without unnecessary duplication
- All diabetes health care providers should be able to access appropriate levels of information to support care delivery, including residential care, intellectual disability, renal services, etc
- People with diabetes are encouraged and enabled to fully participate in their care e.g. via patient portal system
- IT systems all use the same medical terminology coding system e.g. SNOMED-CT-CT, the most comprehensive clinical terminology available
- Diabetes health providers should have access to contemporary guidelines, protocols, clinical decision aids and service directories for diabetes service providers and consumers e.g. Map of Medicine
- Patient data are linked through a common identifier to facilitate regional and national monitoring and evaluation.

---

\(^4\) **Multi-faceted outreach services** provide opportunities for enhanced collaboration with primary health care practitioners, case review, joint consultations, situated learning experiences and seminars or other educational sessions (Gruen, Weeramanthri, Knight, & Bailie, 2003)
9.4 Targeted investment in workforce training and development

- Role delineation should be clear so that diabetes education and training can be appropriately targeted
- All diabetes health care providers, both professionals and non-regulated health workers, should receive appropriate ongoing education and training from an accredited education provider
- Agreed national curriculum and standards should be developed for the delivery of education and training
- The National Diabetes Nursing Knowledge and Skills Framework (NDNKSF) should be utilised as a foundational document to guide curriculum development for all other disciplines
- Ongoing education updates should be a requirement for the delivery of diabetes services
- Informational competency to ensure that health professionals can effectively utilise IT systems should be developed and/or enhanced
- Diabetes healthcare professionals should be trained and supported to enable them to deliver emotional and psychological support themselves, at an appropriate level, with the aim of embedding this as an integral part of healthcare professional training for the future
- Cultural competency should be demonstrated by outcomes measures
- Mentor programmes such as To ohu rata o Aotearoa aimed at increasing the number of Maori specialists should be supported
- A structured clinically focused nurse practitioner training programme should be implemented.

9.5 People with diabetes

- People with diabetes should have access to quality assured evidence-informed self-management education
- A stock take of programmes currently provided should be conducted and effectiveness evaluated
- Structured diabetes self-management education for patients should be provided by those with appropriate training and expertise and in an appropriate setting
- Patient education programmes should meet the five key criteria recommended by the Department of Health and the Diabetes UK Patient Education Working Group (2005).

9.6 Quality Improvement and Assurance

- Quality assurance will underpin all aspects of diabetes service delivery, including education programmes and retinal photo screening. Each component will be expected to have its own specific quality assurance programme
- Key national monitoring indicators should be developed to facilitate nationwide monitoring of the quality of service provision and the diabetes epidemic.
9.7 National oversight and diabetes monitoring

An independent appropriately skilled multidisciplinary group (including patient representation) should be established and funded to oversee workforce development, and to monitor diabetes service delivery and the diabetes epidemic. Such a group could be established and facilitated by the New Zealand Society for the Study of Diabetes (NZSSD) supported by a Maori advisory group and Diabetes New Zealand. In addition, their remit could include the following:

- Endorsement of knowledge and skill frameworks and education and training programmes
- Support of basic and clinical research in diabetes.
- Reporting outcomes which advance the reduction of inequalities as a target
- Development of a national curriculum for structured patient education.
10. Potential Demonstrations

10.1 Nurse Practitioner training programme

Nurse practitioners have significant potential to fill health care gaps through advanced practice capability and strong clinical leadership. The NPAC-NZ nurse practitioner training programme could be demonstrated in one or two sites to test implementation and facilitate the availability of nurse practitioners across the health care system.

10.2 E-learning platform

Information technology is a key platform for the delivery of education for all health professionals. The National Diabetes Nursing Knowledge and Skills Framework (2009) (NDNKSF) is a nationally endorsed framework that is already underpinning nursing undergraduate and postgraduate curriculum. Development of an online learning platform with the NDNKSF informing curriculum for interdisciplinary short courses and ongoing learning will provide a consistent approach to the education of health care providers in New Zealand and improve accessibility.

10.3 Interdisciplinary integrated models for the management of diabetic foot complications in primary secondary and inpatient situations

Diabetes is the major contributing factor to more than half the lower limb amputations that occur in New Zealand. Interdisciplinary integrated models for the management of diabetic foot complications in primary secondary and inpatient situations have proven beneficial. A demonstration site that explores an integrated service based on the model below would be advantageous to explore the possible benefits and outcomes in a New Zealand context.
11. Current innovations with potential for wider implementation

11.1 Patient structured education programme

The Manawatu Horowhenua Tararua Diabetes Trust have well established structured education courses. These are reviewed by the local specialist team, have quality monitoring processes in place and assess patient knowledge, satisfaction and empowerment pre and post course.

11.2 Practice Nurse development

Hutt Valley DHB Diabetes Action programme (including Insulin Management programme) is a programme that has potential to develop the potential of practice nurses in particular and also general practitioners. The focus is on providing a structured programme of care, education and monitoring for people with type 2 diabetes

11.3 Multifaceted outreach services\(^5\) in rural and disadvantaged areas

‘Integrated Secondary Specialist Service in Primary Care for Diabetes Management’ being undertaken in Porirua (currently being trialled in an HRC funded integrated secondary specialist service in primary care project).

11.4 Shared care records

Build on National Health IT Board projects related to shared care records, with diabetes being a further example.

---

\(^5\) **Multi-faceted outreach services** provide opportunities for enhanced collaboration with primary health care practitioners, case review, joint consultations, situated learning experiences and seminars or other educational sessions (Gruen, Weeramanthri, Knight, & Bailie, 2003)
12. References


glucose tolerance: The Da Qing IGT and Diabetes Study. *Diabetes Care*, 20, 537-544.


Kidney disease

Health outcomes sought:
- The number of people requiring renal dialysis with diabetes as the primary cause is reduced.
- Maori, Pacific and Asian populations with diabetes requiring renal dialysis have greater equity with New Zealand Europeans.

Recommendations
- Improve detection of significant clinical nephropathy using annual serum creatinine testing (with eGFR) in accordance with guideline.
- Increase frequency (three-monthly) of serum creatinine/eGFR in those with eGFR < 60.
- A multidisciplinary team should be involved early and use an effective model of care for those with ‘mid-stage’ nephropathy/eGFR < 60 who are at high risk of progressing to renal dialysis.

Foot disease

Health outcomes sought:
- Number of diabetic lower-limb amputations (especially double amputees, above-knee [AKA] and below-knee [BKA] amputations) is reduced.
- Maori and Pacific lower-limb amputation rates are more equitable with those of New Zealand Europeans.

Recommendations
- In primary care patient management systems (PMS), implement support for screening and triage of ‘high-risk’ feet during diabetes annual reviews.
- Review, and where appropriate increase, access to specialised podiatry and foot care services (including total contact casting and pulse doppler assessment) for ‘high-risk’ feet.

Eye disease

Health outcome sought
- Rates of avoidable vision loss and blindness are reduced.

Recommendations
- Improve initial referral and follow-up for retinal screening.
- Progressively implement a national quality assurance programme – based on the guidelines – that includes appropriate standards for training, competency assurance, technical quality and follow-up.
- Update the information technology (IT) systems used by retinal screening services and primary care to allow screening results to be
communicated using a structured message so that the results can be saved and tracked in PMS (as with laboratory results).

- Link the information in PHO, retinal screening and hospital ophthalmology databases to improve the management of screening and treatment services and to facilitate clinical audit.

**Hospital inpatients with diabetes**

*Health outcomes sought*

- Rate of Ambulatory Sensitive Hospital (ASH) admissions for diabetes-related causes is reduced.
- Excess length of stay for inpatients with diabetes is reduced.
- Objective and perceived quality of care for inpatients with diabetes is improved.

*Recommendations*

- Review the existing differences among DHBs in inpatient services for people with diabetes to see if there are associated differences in length of stay or readmission rates.
- Specifically consider diabetes in practical research to reduce ASH.

**Type 1 diabetes children and young people**

*Recommendations*

- Enhance the information system used to support clinical care, applied research and clinical audit.
- Provide more clarity for children and their carers about the range of services that are available, and ensure that these services are nationally consistent.
- Improve the support provided by diabetes nurse specialists for teachers, in association with the development of specific provision by the Ministry of Education for children with special medical needs.
- Make specific provision for a structured hand-over from paediatric to adult care.
### Appendix B: Diabetes Service Workforce Review Group

Clinical and project lead: Helen Snell, Nurse Practitioner

<table>
<thead>
<tr>
<th>Name</th>
<th>Viewpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrea Rooderkerk</td>
<td>Diabetes Nurse Specialist</td>
</tr>
<tr>
<td>Sue Wood</td>
<td>Director of Nursing</td>
</tr>
<tr>
<td>Dr Ole Schmiedel</td>
<td>Endocrinologist</td>
</tr>
<tr>
<td>Kirsty Newton</td>
<td>Diabetes Nurse Specialist – Adolescents and youth</td>
</tr>
<tr>
<td>Karen Reed</td>
<td>Consumer representative</td>
</tr>
<tr>
<td>Sonia Rapana</td>
<td>Associate DoN Primary Health Care</td>
</tr>
<tr>
<td>Dr Kirsten Coppell</td>
<td>Public Health Medicine Specialist</td>
</tr>
<tr>
<td>Amy Liu</td>
<td>Senior Diabetes Dietitian</td>
</tr>
<tr>
<td>Michele Garrett</td>
<td>Specialist podiatrist</td>
</tr>
<tr>
<td>Megan Larken</td>
<td>Senior Policy Analyst, Health Workforce New Zealand, MoH</td>
</tr>
</tbody>
</table>
Appendix C: Predicted diabetes prevalence

Table 1. Summary of predicted diabetes prevalence (Emmanuel Jo, Martin Tobias & Li-Chia Yeh, 2011)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Population (Demographic)</th>
<th>Total Population (BAU)</th>
<th>Total Diabetes population (Demographic)</th>
<th>Total Diabetes Population (BAU)</th>
<th>Difference in Diabetes Pop between DEMO and BAU</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>4,044,882</td>
<td>4,044,882</td>
<td>174,034</td>
<td>174,034</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>4,198,923</td>
<td>4,198,930</td>
<td>203,253</td>
<td>203,330</td>
<td>77</td>
</tr>
<tr>
<td>2011</td>
<td>4,363,838</td>
<td>4,364,065</td>
<td>233,856</td>
<td>237,156</td>
<td>3,300</td>
</tr>
<tr>
<td>2012</td>
<td>4,395,846</td>
<td>4,396,143</td>
<td>240,148</td>
<td>244,676</td>
<td>4,528</td>
</tr>
<tr>
<td>2013</td>
<td>4,427,515</td>
<td>4,427,888</td>
<td>246,478</td>
<td>252,433</td>
<td>5,955</td>
</tr>
<tr>
<td>2014</td>
<td>4,458,816</td>
<td>4,459,271</td>
<td>252,837</td>
<td>260,420</td>
<td>7,583</td>
</tr>
<tr>
<td>2015</td>
<td>4,489,723</td>
<td>4,490,264</td>
<td>259,215</td>
<td>268,629</td>
<td>9,414</td>
</tr>
<tr>
<td>2016</td>
<td>4,520,207</td>
<td>4,520,839</td>
<td>265,801</td>
<td>277,052</td>
<td>11,451</td>
</tr>
<tr>
<td>2018</td>
<td>4,579,806</td>
<td>4,580,627</td>
<td>278,361</td>
<td>294,506</td>
<td>16,144</td>
</tr>
<tr>
<td>2019</td>
<td>4,608,871</td>
<td>4,609,791</td>
<td>284,716</td>
<td>303,520</td>
<td>18,804</td>
</tr>
<tr>
<td>2020</td>
<td>4,637,417</td>
<td>4,638,438</td>
<td>291,040</td>
<td>312,715</td>
<td>21,674</td>
</tr>
<tr>
<td>2021</td>
<td>4,665,423</td>
<td>4,666,547</td>
<td>297,326</td>
<td>322,081</td>
<td>24,755</td>
</tr>
<tr>
<td>2022</td>
<td>4,692,869</td>
<td>4,694,097</td>
<td>303,564</td>
<td>331,611</td>
<td>28,047</td>
</tr>
<tr>
<td>2023</td>
<td>4,719,737</td>
<td>4,721,072</td>
<td>309,745</td>
<td>341,296</td>
<td>31,550</td>
</tr>
<tr>
<td>2024</td>
<td>4,746,012</td>
<td>4,747,454</td>
<td>315,862</td>
<td>351,127</td>
<td>35,265</td>
</tr>
<tr>
<td>2025</td>
<td>4,771,679</td>
<td>4,773,228</td>
<td>321,907</td>
<td>361,097</td>
<td>39,191</td>
</tr>
<tr>
<td>2026</td>
<td>4,796,724</td>
<td>4,798,382</td>
<td>327,871</td>
<td>371,198</td>
<td>43,327</td>
</tr>
<tr>
<td>2027</td>
<td>4,821,134</td>
<td>4,822,902</td>
<td>333,747</td>
<td>381,420</td>
<td>47,673</td>
</tr>
<tr>
<td>2028</td>
<td>4,844,900</td>
<td>4,846,778</td>
<td>339,528</td>
<td>391,756</td>
<td>52,227</td>
</tr>
<tr>
<td>2029</td>
<td>4,868,011</td>
<td>4,869,999</td>
<td>345,209</td>
<td>402,197</td>
<td>56,989</td>
</tr>
<tr>
<td>2030</td>
<td>4,890,458</td>
<td>4,892,557</td>
<td>350,781</td>
<td>412,737</td>
<td>61,956</td>
</tr>
<tr>
<td>2031</td>
<td>4,912,234</td>
<td>4,914,444</td>
<td>356,239</td>
<td>423,366</td>
<td>67,127</td>
</tr>
<tr>
<td>2032</td>
<td>4,933,333</td>
<td>4,935,654</td>
<td>361,578</td>
<td>434,078</td>
<td>72,500</td>
</tr>
<tr>
<td>2033</td>
<td>4,953,747</td>
<td>4,956,179</td>
<td>366,791</td>
<td>444,863</td>
<td>78,072</td>
</tr>
<tr>
<td>2034</td>
<td>4,973,473</td>
<td>4,976,015</td>
<td>371,874</td>
<td>455,715</td>
<td>83,841</td>
</tr>
<tr>
<td>2035</td>
<td>4,992,505</td>
<td>4,995,158</td>
<td>376,821</td>
<td>466,626</td>
<td>89,805</td>
</tr>
<tr>
<td>2036</td>
<td>5,010,840</td>
<td>5,013,602</td>
<td>381,629</td>
<td>477,587</td>
<td>95,959</td>
</tr>
</tbody>
</table>
Appendix D: Diabetes prevalence by region and ethnicity

The table below displays the number of people by DHB known to have diabetes (based on their PHO) according to the Virtual Diabetes Register (VDR) (Jo, Wright, Dawson, Orr-Walker & Drury, 2010). The algorithm developed by the authors is more specific than sensitive so it is probably an underestimate, but almost all PHOs now accept this is realistic. It could underestimate the problem by up 5-10%, but as prevalence is increasing at that rate annually it doesn’t make much difference (Drury, Dawson & Jo, personal communication, 2010).

Table 2: Diabetes prevalence by region and ethnicity

<table>
<thead>
<tr>
<th>DHB level table</th>
<th>Actual based on VDR V6.1</th>
<th>European/Other</th>
<th>Maori</th>
<th>Pacific People</th>
<th>Indian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
<td>126,330</td>
<td>24,566</td>
<td>19,616</td>
<td>8,942</td>
<td></td>
<td>179,454</td>
</tr>
<tr>
<td>Northland</td>
<td>4,507</td>
<td>2,785</td>
<td>93</td>
<td>43</td>
<td></td>
<td>7,428</td>
</tr>
<tr>
<td>Waitemata</td>
<td>13,407</td>
<td>1,350</td>
<td>1,999</td>
<td>858</td>
<td></td>
<td>17,614</td>
</tr>
<tr>
<td>Auckland</td>
<td>11,694</td>
<td>1,261</td>
<td>5,184</td>
<td>2,894</td>
<td></td>
<td>21,033</td>
</tr>
<tr>
<td>Counties Manukau</td>
<td>11,356</td>
<td>3,230</td>
<td>7,803</td>
<td>2,982</td>
<td></td>
<td>25,371</td>
</tr>
<tr>
<td>Waikato</td>
<td>11,169</td>
<td>3,564</td>
<td>577</td>
<td>465</td>
<td></td>
<td>15,776</td>
</tr>
<tr>
<td>Lakes</td>
<td>2,611</td>
<td>1,605</td>
<td>132</td>
<td>68</td>
<td></td>
<td>4,416</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>6,167</td>
<td>2,101</td>
<td>135</td>
<td>225</td>
<td></td>
<td>8,628</td>
</tr>
<tr>
<td>Tairawhiti</td>
<td>1,271</td>
<td>1,101</td>
<td>57</td>
<td>11</td>
<td></td>
<td>2,440</td>
</tr>
<tr>
<td>Hawkes Bay</td>
<td>4,612</td>
<td>1,528</td>
<td>262</td>
<td>77</td>
<td></td>
<td>6,479</td>
</tr>
<tr>
<td>Taranaki</td>
<td>5,119</td>
<td>719</td>
<td>54</td>
<td>35</td>
<td></td>
<td>5,927</td>
</tr>
<tr>
<td>MidCentral</td>
<td>5,211</td>
<td>728</td>
<td>183</td>
<td>85</td>
<td></td>
<td>6,207</td>
</tr>
<tr>
<td>Whanganui</td>
<td>2,279</td>
<td>698</td>
<td>43</td>
<td>30</td>
<td></td>
<td>3,050</td>
</tr>
<tr>
<td>Capital and Coast</td>
<td>6,848</td>
<td>812</td>
<td>1,402</td>
<td>544</td>
<td></td>
<td>9,606</td>
</tr>
<tr>
<td>Hutt</td>
<td>3,970</td>
<td>757</td>
<td>716</td>
<td>265</td>
<td></td>
<td>5,708</td>
</tr>
<tr>
<td>Wairarapa</td>
<td>1,594</td>
<td>261</td>
<td>45</td>
<td>11</td>
<td></td>
<td>1,911</td>
</tr>
<tr>
<td>Nelson Marlborough</td>
<td>4,361</td>
<td>305</td>
<td>55</td>
<td>32</td>
<td></td>
<td>4,753</td>
</tr>
<tr>
<td>West Coast</td>
<td>1,067</td>
<td>90</td>
<td>6</td>
<td>8</td>
<td></td>
<td>1,171</td>
</tr>
</tbody>
</table>
Appendix E: Prevalence data for type 1 diabetes under the age of 15 years in the Canterbury district

Canterbury has the only reliable and historical prevalence data on type 1 diabetes available in New Zealand. The number of type 1 diabetes cases under 15 years at 1 November 2003 was 129 (Wu et al., 2005). Table 1 shows the number of new cases by age group over the last 40 years. There have been 143 incident cases aged 0-14 years since the prevalence was determined in 2003. However, these data do not account for new cases diagnosed outside the Canterbury geographical region moving into the CDHB catchment or for incident cases leaving Canterbury.

Table 1. New cases of Type 1 Diabetes by Age at Presentation

<table>
<thead>
<tr>
<th>Years</th>
<th>0-4 years</th>
<th>5-9 years</th>
<th>10-14 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970-74</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>32</td>
</tr>
<tr>
<td>1975-79</td>
<td>7</td>
<td>14</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td>1980-84</td>
<td>6</td>
<td>8</td>
<td>25</td>
<td>39</td>
</tr>
<tr>
<td>1985-89</td>
<td>6</td>
<td>7</td>
<td>26</td>
<td>39</td>
</tr>
<tr>
<td>1990-94</td>
<td>21</td>
<td>28</td>
<td>30</td>
<td>79</td>
</tr>
<tr>
<td>1995-99</td>
<td>23</td>
<td>27</td>
<td>34</td>
<td>84</td>
</tr>
<tr>
<td>2000-04</td>
<td>23</td>
<td>32</td>
<td>43</td>
<td>98</td>
</tr>
<tr>
<td>2005-09</td>
<td>23</td>
<td>37</td>
<td>48</td>
<td>108</td>
</tr>
</tbody>
</table>

The following data is provided to address the issue of temporal change. Tables 2 and 3 show the mean incidence of type 1 diabetes by decade, and the rate of change in incidence rate with time derived from linear regression, respectively.

Table 2. Mean Incidence of Type 1 Diabetes by Age at Presentation and Decade

<table>
<thead>
<tr>
<th>Decade</th>
<th>0-4 years</th>
<th>5-9 years</th>
<th>10-14 years</th>
<th>0-14 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970-79</td>
<td>5.58</td>
<td>7.11</td>
<td>10.52</td>
<td>7.58</td>
</tr>
<tr>
<td>1980-89</td>
<td>5.15</td>
<td>5.34</td>
<td>17.98</td>
<td>15.37</td>
</tr>
<tr>
<td>1990-99</td>
<td>17.30</td>
<td>22.41</td>
<td>23.93</td>
<td>22.77</td>
</tr>
<tr>
<td>2000-09</td>
<td>17.42</td>
<td>24.92</td>
<td>32.58</td>
<td>26.72</td>
</tr>
</tbody>
</table>

Data are cases/100 000/year

The data are best appreciated graphically as shown in figure 1 below. In children under 10 years of age there has been a three- to four-fold increase in incidence since 1990.
Figure 1. Incidence of Type 1 Diabetes in Canterbury by Age at Presentation

Provided by Dr Jinny Willis, Scientist, Lipid & Diabetes Research Group, Christchurch.
Appendix F: Scenario one - Type 2 diabetes

The Diabetes Care Pathway – Type 2 Diabetes

Initial Assessment
- Assess whether there is a need to refer to a specialist service
- Urgently refer adults who are unwell, who have ketones in their urine or a blood glucose level > 25mmol/L to a specialist diabetes team for possible hospital admission
- Refer adults with diabetic ketoacidosis (DKA) or diabetic hyperosmolar hyperglycaemic non-ketotic syndrome (HHSNS) for urgent hospital treatment
- Refer adults under 30 with Type 2 to a specialist diabetes team for outpatient assessment
- Newly diagnosed people with none of the above symptoms should be managed within primary health care.

Initial Information/Advice
- Explain the condition and its management, taking account of people’s emotional state and cultural/social background
- Provide information about local Diabetes society & DNZ
- Discuss impact of the condition on work

Psychological Support
- Diabetes healthcare team to assess impact and discuss anxieties/concerns about diagnosis and the future with the person with diabetes and identify immediate support (family, carers, friends)
- Provide additional support as necessary.

Treatment Begins/Initial Dietary Advice
- Initial treatment includes lifestyle modification (diet, physical activity) monitoring of blood glucose levels, physical activity and smoking cessation. May also include initiation of diabetes tablets and/or insulin.

Initial Care Planning and Management
- Care planning, usually reviewed annually, is at the heart of managing a person’s diabetes.
  - Annual review – Get Checked
  - Primary health care/Public health led
  - Specialist/Secondary care led

Prevention
- Initial assessment
- Early Detection
- Diagnosis
- Involvement: GPs, PN, dietitian, physical activity professionals, podiatrist, PHO nurses, pharmacist etc.

First Year
- Self care support
- Continuous psychological support
- Optimisation of blood glucose control
- Advice and treatment to prevent and manage cardiovascular risk factors – proactive management of blood pressure and lipids
- Agree continuing care planning
- Take account of the needs of different population groups, e.g. teenagers, Maori, Pacific peoples and those living in sheltered nursing and residential care

Continuing Care
- Annual review (Primary health care with episodic specialist care)
  - Exploration of any concerns, providing support and counselling and psychological support as appropriate
  - Assessment of ability to manage self-care
  - Advice on healthy lifestyle choices
  - Review of metabolic control
    - HbA1c and blood glucose monitoring
    - Episodes of diabetic ketoacidosis (DKA) and hyperglycaemia
  - Dietary assessment
  - Advice on clinical options
  - Weight management
  - Sexual health
  - Monitoring of physical growth and development (children)
  - Smoking cessation
  - Pain management
  - Prevention, early detection and management of long-term complications (diabetic retinopathy, microvascular complications, diabetic renal disease, diabetic neuropathy, cardiovascular risk factors, hypertension and foot problems)
  - Identification and management of other problems, such as depression, eating disorders, skin problems etc
  - Agree revised care planning and referral to specialist services as required
  - The cycle of care continues

Events-Related Care
- Inpatient/Outpatient
- New stroke
- Diabetic ketoacidosis
- Severe hypoglycaemia
- Hypo unawareness
- Hyperosmolar hyperglycaemic non-ketotic syndrome
- Pregnancy
- Travel plans
- Hospital admission care
- New complications
- Development of proteinuria and/or microalbuminuria
- Nephropathy/neural impairment
- Dental disease
- New cataracts/diabetes
- New eye complication
- Major lifestyle event
- Residential care
- Palliation

How Structured/Systematic Care and Events-Related Care Link Up

Structured/systematic care is the means by which the person with diabetes and their healthcare team work together to prevent short-term and long-term complications. Events-related care refers to episodes of care that the person with diabetes may need at any time (at diagnosis, in the first year, during continuing care generally managed by general practice team) and which may require access to specialist practitioners not normally involved in their structured/systematic care. When such events-related care is necessary, it needs to be combined with the person’s structured/systematic care. When the episode of events-related care is complete, the person’s structured/systematic care continues as normal. Many episodes of events-related care will be short-term, eg diabetic ketoacidosis. Others, such as residential care, will be long-term. When the person requires such long-term, events-related care, their structured / systematic care will need to be reviewed and revised accordingly. This includes identifying who will do what, when and where to ensure the person continues to receive fully effective care.

Adapted from Structured Care (3) Diabetes
U.K. August 2004

52
Appendix G: Scenario two - Type 1 diabetes in children

The Diabetes Care Pathway - Children to 18 Years

Initial Assessment
- Refer children and young people with signs symptoms of diabetes urgently on the same day to a specialist diabetes paediatric team for hospital admission and insulin therapy
- Refer immediately with diabetic ketoacidosis (DKA)
- Refer adults under 18yrs with Type 2 to a specialist diabetes team for outpatient assessment

Initial Information/Advice
- Explain the condition and its management, taking account of people's emotional state and cultural/social background
- Provide information about diabetes camps
- Discuss impact of the condition on school life, sports and activity

Psychological Support
- Diabetes healthcare team to assess impact and discuss anxieties/concerns about diagnosis and the future with the person with diabetes and identify immediate support (family, carers, friends)
- Provide additional support as necessary

Treatment Begins/Initial Dietary Advice
- Initial treatment includes oral or insulin therapy, where appropriate, and advice on diet, monitoring, physical activity, driving, smoking cessation, alcohol and recreational drugs

Initial Care Planning and Management
- Care planning, usually reviewed 3-6 monthly by specialist, is at the heart of managing a person's diabetes

Prevention (Type 2)*
- Early Detection*
- Diagnosis
  - Initial assessment
  - Initial information/advice and referral
  - Psychological support
  - Treatment begins/Initial dietary advice
  - Initial care and management planning

First Year*
- Continued psychological support
- Optimisation of blood glucose control, including introduction of oral therapies (Type 2) or insulin (Type 1)
- Advice and treatment to prevent/reduce risk for diabetic complications
- Agree continuing care planning
- Take account of the needs of different population groups, e.g., children, adolescents, Maori, Pacific Island

Involvement: General practice teams, specialist nurse (CNS/AP), paediatrician, dietitian, psychologist, adult physicians, social worker

Regular Review and Continuing Care*
- Annual review
- Exploration of any concerns, providing support counselling or psychological support as appropriate
- Assessment of ability to manage self-care
- Pump therapy
- Advice on healthy lifestyle choices, including sexual health
- Review of metabolic control
- HbA1C and blood glucose monitoring
- Evaluation of diabetic ketoacidosis (DKA) and hypoglycaemia
- Dietary assessment
- Advice on clinical options
- CVD risk assessment
- Monitoring of physical growth and development
- Weight management
- Smoking cessation
- Prevention/early detection and management of long-term complications (diabetic retinopathy, diabetic renal disease, diabetic neuropathy, cardiovascular risk factors, hypertension and foot problems)
- Identification and management of other problems, such as depression, eating disorders, skin problems etc
- Agree revised care planning
- The cycle of care continues

Events-Related Care
- Inpatient/Outpatient
- Diabetic Ketoacidosis
- Severe Hypoglycaemia
- Hypo Unawareness
- Major treatment change, starting insulin pump

Investigative Procedure plans
- Travel plans
- Pregnancy involvement with Osteoporosis, specialist nurse, midwife, dietitian

Hospital Admission/Inpatient nurse/ Specialist nurses
- Development of proteinuria and/or microalbuminuria and/or nephropathy/renal impairment
- New erectile dysfunction
- New eye complication
- Major life event

How Structured/Systematic Care and Events-Related Care Link Up
Structured/systematic care is the means by which the person with diabetes and their healthcare team work together to prevent short-term and long-term complications. "Events-related care" refers to episodes of care that the person with diabetes may need at any time (at diagnosis, in the first year, during continuing care) and which may require access to specialist practitioners not normally involved in their structured/systematic care. When such events-related care is necessary, it needs to be combined with the person's structured/systematic care. When the episode of events-related care is complete, the person's structured/systematic care continues as normal. Many episodes of events-related care will be short-term, eg diabetic ketoacidosis. When the person requires long-term events-related care, their structured/systematic care will need to be reviewed and revised accordingly. This includes identifying who will do what, when and where to ensure the person continues to receive fully effective care.

Adapted from Structured Care (3), Diabetes UK, August 2004
Appendix I: Diabetes Model of Care

## Diabetes Model of Care

<table>
<thead>
<tr>
<th>Workforce</th>
<th>Community Awareness and Prevention</th>
<th>Prevention &amp; Early Diagnosis in High-Risk Groups</th>
<th>Optimal Initial &amp; Longer Term Management</th>
<th>Early Detection &amp; Optimal Management of Complications</th>
<th>Prevention &amp; Management of Acute Episodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Population</td>
<td>All at Risk of Diabetes/ Undiagnosed Diabetes</td>
<td>Newly Diagnosed Diabetes</td>
<td>Established Complications</td>
<td>Acute Episodes</td>
<td></td>
</tr>
</tbody>
</table>

### Public Health
- NPY, general practitioners
- Primary health care
- Public health nursing
- Local government organisations
- Community health workers
- Primary health care
- Schools and other public settings

### Primary Health Care Multidisciplinary Prevention and Management
- Primary care providers
- Diabetes nurses
- Patients and families
- Community health workers
- Other health professionals

### Acute and Specialist Multidisciplinary Teams
- Team members
- Services provided

---

Adapted from Department of Health, Western Australia. (2009).
Diabetes Model of Care

Adapted from Department of Health, Western Australia. (2008).
Glossary

Interdisciplinary teams: comprised of different disciplines where members share their views to pursue a common objective making it possible to understand issues in the same way and thus carry out a concerted intervention (Lessard, Morin & Sylvain, 2008)

Multi-faceted outreach services: provide opportunities for enhanced collaboration with primary health care practitioners, case review, joint consultations, situated learning experiences and seminars or other educational sessions (Gruen, Weeramanthri, Knight, & Bailie, 2003)

Patient portals: are health-care related online applications that allow patients to interact and communicate with their health care providers

SNOMED-CT CT: (Systematized Nomenclature of Medicine -- Clinical Terms), is a systematically organised computer processable collection of medical terminology covering most areas of clinical information such as diseases, findings, procedures, microorganisms, pharmaceuticals etc. It allows a consistent way to index, store, retrieve, and aggregate clinical data across specialties and sites of care. It also helps organising the content of medical records, reducing the variability in the way data is captured, encoded and used for clinical care of patients and research, see e.g. Ruch, et al., 2008.