NATIONAL ASSOCIATION OF DIABETES CENTRES

FINAL REPORT

ANDIAB 2011

AUSTRALIAN NATIONAL DIABETES INFORMATION AUDIT & BENCHMARKING

December 2011

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Note *that Table Numbers remain the same as in other ANDIAB Reports for ease of comparison, and are the same as in 2006 from Table 26 onwards, having been renumbered then, in sequence, following removal of the Haemoglobin, NDSS, BCD and Psychiatric Therapy Items collected in previous years.*

FOREWORD

ANDIAB, the Australian National Diabetes Information Audit and Benchmarking exercise, provides an overview of the clinical status of people with diabetes attending specialist diabetes services. Participating Diabetes Centres and Endocrinologists can evaluate their data against their peers, enabling them to identify and implement mechanisms to improve outcomes amongst their patients.

This document reports on ANDIAB 2011, the eighth diabetes data collection conducted by the National Association of Diabetes Centres [NADC]. This year 42 data collection sites participated, with de-identified data on over 4600 individuals attending participating specialist diabetes services during the months of May or June 2011, providing clinical process and outcomes information. This year, again, several sites provided data from established databases. Hopefully the information contained in this report of pooled data from all sites is useful and will be widely disseminated.

The outcome of ANDIAB has resulted in the collection of substantial clinical data on diabetes across the country, thus providing a framework by which strategies for caring for people with diabetes could be developed both within our Centres and nationally.

Into the future it is hoped that Specialist Paediatric Hospitals and services will more consistently contribute data, and that more Adult Centres will be able to participate with electronic data from established databases.

We acknowledge the very generous support of the Australian Government Department of Health and Ageing who provided the funding necessary to undertake ANDIAB 2011.

The NADC is proud of the work ANDIAB is doing and would like to thank all the dedicated multidisciplinary teams who have contributed to this report.

Assoc. Professor Sophia Zoungas
Chairperson
National Association of Diabetes Centres
December 2011

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EXECUTIVE SUMMARY

ANDIAB [Australian National Diabetes Information Audit & Benchmarking] is a well established, important biennial, quality activity conducted by the National Association of Diabetes Centres [NADC], in specialist diabetes services across Australia, in all States and Territories, [although in some years, some States and Territories have not submitted data]. Participating specialist diabetes services, [Diabetes Centres and specialist endocrinologists in private practice], receive an individualised report comparing their diabetes practice processes, and patient outcome data, with their peers.

In 2011, 39 Diabetes Centre members of the NADC and 3 specialist endocrinologists in private practice, provided de-identified data on a total of 4629 individuals seen during the one-month survey period of May [or June] 2011, or a period of 2011 from those using an in-house database. The dataset collected was the Australian Diabetes Society [ADS] NDOQRIN [National Diabetes Outcomes Quality Review INitiative] minimum dataset for quality care in diabetes, published as The Data Set Specification - Diabetes – National Health Data Dictionary Version 12 – Australian Institute of Health and Welfare [AIHW]. This dataset has since been enhanced, and is now online as part of the AIHW – Metadata Online Registry ['METeOR'] as the Diabetes (clinical) Data Set Specification at http://meteor.aihw.gov.au/content/index.phtml/itemId/304865. The dataset contains demographic, clinical, biochemical and outcome data items that have standardised definitions, and has been promulgated for collection in all clinical practice settings. The participants in the ANDIAB 2011 survey completed a one page scannable form, or provided data electronically by email, containing these data items.

Based on feedback from participants in previous ANDIAB collections, and review of experience in the 2006 Diabetes Collaborative, several enhancements were made to the dataset collected in 2009. It was decided to collect the same dataset in 2011 with the addition of just two fields related to eGFR [see What's New? - E]. The previously created separate data collection form for individuals eighteen years of age or less containing data items of most relevance to them, was not utilised as Specialist Paediatric Hospitals and services did not contribute data in 2011.

In addition to the primary output audit report to participants, the data form an important source of cross-sectional data on the clinical status of individuals attending specialist diabetes services across the country. Analysis of the pooled data from this exercise forms the basis of this report. Prior to analysis and reporting, every effort was made to ensure data were complete and correct. Sites were given an opportunity to supply any missing data and to validate questionable data. This reduced the missing data in six of the nine elements sought, by a half - to over 85% {52.2-86.9%} [see Table 24[a] page 24]. Any remaining questionable data after site review and correction were excluded from analysis. All identified duplicate records were removed.

Data have been analysed in total, and reported as Adult Forms [all 4629 individuals reported], since there were no Paediatric data collected in 2011. Outcomes are reported as the % *of the total patient group* unless otherwise indicated. An exception example is the percent with microalbuminuria, where the analysis is noted to represent the percent *of those where the test result was provided.*

Pooled data analysis has been undertaken and data have been grouped in order to assess various aspects of patient status. Results indicate:

- a slight preponderance of males [53.5% overall]; [52.0 % - Adult Forms in 2009];
- an average age of 57.2 ± 17.3 years, [56.8 ± 17.3 years - Adult Forms in 2009];
- an average duration since diagnosis of diabetes of 13.9 ± 10.6 years, [13.3 ± 10.4 years - Adult Forms in 2009]; and
- a total of 72.5% Type 2 diabetes and 22.7% Type 1 diabetes overall.

Patient Status	ALL Forms % / Mean + SD	Adult Forms % / Mean + SD	Paediatric Forms % / Mean + SD
Gender - Males		53.5%	
Average Age		57.2 ± 17.3	
Average Duration		13.9 ± 10.6	
Diabetes Type - Type 1		22.7%	
Diabetes Type - Type 2		72.5%	

In regards to Risk Factors there were:

- 9.9% current smokers [10.3% in Adult Forms in 2009];
- 57.0% on anti-hypertensive therapy [52.2% in Adult Forms in 2009]; and
- 60.2% on anti-lipid therapy [52.9% in Adult Forms in 2009].

Risk Factors	ALL Forms %	Adult Forms %	Paediatric Forms %
Current Smokers		9.9%	
Past Smokers		23.5%	
On Anti-hypertensive therapy		57.0%	
On Anti-lipid therapy		60.2%	

Blood Glucose Control data showed a Mean Glycated Haemoglobin of 8.5 ± 1.8% for Type 1 & 8.0 ± 1.7% Type 2 for All (*first Table below*), with 30.2% ≤1% above the Upper Limit of Normal & 42.6% >2% above the Upper Limit of Normal (*second Table below*).

Glycated Hb	[All n] ⇓	All n = 4629	Adult n = 4629	Paediatric n = 0
Overall	4244		8.1 ± 1.7	
Type 1	993		8.5 ± 1.8	
Type 2	3114		8.0 ± 1.7	

Glycated Hb	[All n] ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
≤1% above ULN	1281		30.2%	
1-2% above ULN	1156		27.2%	
>2% above ULN	1807		42.6%	
Missing ULN or HbA1c	385		9.1%	

In those where a lipid test result was reported [**ADULT** Forms] (*see Table over...*):

- 11.3% had an elevated Total Cholesterol level [above 5.5 mmol/L];
- 19.9% had an elevated Total Cholesterol level [above 5.0 mmol/L];
- 34.5% had an elevated LDL Cholesterol level [≥ 2.5 mmol/L];
- 27.8% had an elevated Triglyceride level [above 2.0 mmol/L]; and
- 27.6% had a reduced HDL Cholesterol level [below 1.0 mmol/L].

Lipid test results	ALL Forms %	Adult Forms %	Paediatric Forms %
Total Cholesterol > 5.5		11.3%	
Total Cholesterol > 5.0		19.9%	
LDL Cholesterol ≥ 2.5		34.5%	
Triglyceride > 2.0		27.8%	
HDL Cholesterol < 1.0		27.6%	

Data regarding current patient status [**ADULT** Forms] revealed the presence of:

- a current foot ulcer in 2.1% [1.7 % in 2009];
- an active foot lesion [other than an ulcer] in 2.5% [1.8 % in 2009];
- a previous foot ulcer history in 5.5% [3.9 % in 2009];
- Peripheral Vascular Disease in 11.7% [9.8 % in 2009]; and
- Peripheral Neuropathy in 21.9% [18.6 % in 2009].

Current patient status	ALL Forms %	Adult Forms %	Paediatric Forms %
Current foot ulcer		2.1%	
Active foot lesion		2.5%	
Previous foot ulcer		5.5%	
Peripheral Vascular Disease		11.7%	
Peripheral Neuropathy		21.9%	

Diabetes Complications [or Events], were reported as either having developed or been discovered in the previous twelve months, or prior to the last twelve months. An assessment of 'This Complication/Event at ANY Time' represents the percent *of the **ADULT** patient group* [n=4629] where each individual with an event in and/or prior to the last 12 months [or both] is counted only once; for example 12.0% of individuals had at least one Myocardial Infarct [see Table below & Tables 7a-7c pages 12-13].

Findings were:	Last 12 months	Prior to Last 12 months	This Event at ANY Time
Severe Hypoglycaemia	4.8%	Not Assessed	N/A
Myocardial Infarct	4.0%	8.8%	12.0%
CABG/Angioplasty/Stent	2.7%	9.5%	11.6%
Cerebral Stroke	1.6%	4.2%	5.6%
End Stage Renal Disease #	0.4%	2.4%	2.8%
Lower Limb Amputation	0.7%	2.1%	2.6%
New Blindness	0.9%	1.0%	1.3%
Erectile Dysfunction [%males] #	2.1%	22.6%	25.2%

*[# Represents data for 'Yes' in the last 12 months & 'No' previously for these items {excluding those with 'Yes' in last 12 months and 'Missing' previously}. If these are included the respective **Adult** % would be ESRD 0.5% and ED 2.6%}. See Table 7[a] page12 for full explanation of these calculations].*

NOTES:

[1] In 2009 a significant amount of the data provided [5498 of the 8563 individuals] came from established in-house databases [ie Electronic data]. In 2011 this was again substantial [1300 of the 4629 individuals]. Some data fields not recorded in these databases have contributed to the increased amount of Missing Data overall, and make comparison of 'ANDIAB Process performance' difficult to compare to previous years.

[2] In 2009 Six 'Electronic' data sites provided 'grouped' rather than 'individual' data for Blood Pressure [BP], HbA1c and Lipids, [ie they provided their BP data, in fact, as either <130/80 or >=130/80 rather than the *actual* recorded BP level, as this is how they recorded and stored these data in their databases]. These sites subsequently made the decision to change the way they collected and recorded these data (to enable them to be able to compare with their peers), and thus in 2011 provided actual results for Blood Pressure, HbA1c and Lipids.

ANDIAB is a biennial quality exercise undertaken in specialist diabetes services, from which large amounts of previously unavailable data are provided. These data can assist in reporting diabetes indicators, and be analysed to inform on the health status of, and outcomes present in, individuals with diabetes assessed in this clinical practice setting.

ANDIAB could be applied to diabetes management assessment in other clinical practice settings including primary care, and the process has potential applicability in other chronic disease settings.

ANDIAB 2011 had participation of every State and Territory (except NT), but no participation by Specialist Paediatric Centres. Despite this, with the equal second largest number of participating sites [42] since 1999, and the fourth largest number of individuals' data ever reported [4629], it has been a successful initiative this year.

In its current form, with a minimal number of sites with in-house databases providing data (and thus a reliance on scannable paper form technology), ANDIAB will, in our view, be difficult for sites to sustain. There needs to be a concerted effort by Specialist Diabetes Services to acquire electronic databases from which they can not only run their day-to-day activities and communicate with referring health professionals, but also undertake research and participate in quality initiatives such as ANDIAB. If most sites had in-house databases the potential would exist to extract data more frequently and provide comparative audit reports, perhaps again on an annual basis.

Another issue of concern relates to the 'repetitive' nature of the data collection, a concern raised at the Best Practice and Diabetes Centres [BPDC] Meeting in July 2011. It was suggested that an alternative could be a smaller and/or more targeted data collection if ANDIAB continues in the future. A further option could be to conduct a longitudinal follow-up review analysis as was done in 2003, however this would be labour intensive for Sites and possibly a less attractive alternate option.

Finally, it should be noted that the Commonwealth funded ANDIAB Project 2011-2012 has provided funds not only for ANDIAB 2011, but also an ANDIAB2 collection in 2012 *and* for the Central ANDIAB database application to be further reviewed and revised. One of several enhancements to ANDIAB reporting capabilities in 2009, was our ability to provide FULL Site and Doctor Reports, *and* this Final Report of Pooled Data, in .pdf format, including all Tables and Graphs. Thus, because of the way reports are now generated, we have the ability to provide participants with complete electronic as well as hard copy reports – [the former having not been possible prior to 2009].

We recommend

- ANDIAB continue as a regular audit activity in specialist diabetes services;
- That said, there needs to be a concerted effort by Specialist Diabetes Services to acquire electronic databases from which they can not only run their day-to-day activities and communicate with referring health professionals, but also undertake research and participate in quality initiatives such as ANDIAB;
- That further improvements to the format of the data that are collected be supported in order to ensure the relevance of this exercise to participants is retained. This should include consideration of smaller and/or more targeted data collection in the future, or perhaps a longitudinal follow-up review analysis as was done in 2003;
- ANDIAB could be extended to include data from other clinical practice settings.

WHAT'S NEW ?

In ANDIAB 2011 we collected the same dataset as in 2009 with the addition of just 2 new fields related to eGFR (*see below*).

In ANDIAB 2009 there were several changes to the collection in response to feedback from participants in previous ANDIAB collections, and a review of experience in the 2006 Diabetes Collaborative. The aim of that project was to conduct a National Breakthrough Collaborative of Diabetes Centres that had participated in several ANDIAB data collections, in order to develop clinical practice strategies to improve diabetes care. The Collaborative specifically explored the barriers to achieving therapy targets, attempted to address these at health professional and patient levels, and specifically attempted to impact on Blood Pressure and Lipid Status of referred patients. The ultimate goal was to implement strategies to impact positively on diabetes care and outcomes. In 2006, ANDIAB followed the lead of the Collaborative, and collected more data on Blood Pressure and Lipid therapies and omitted Eye and Feet data completely.

In 2009, some, but not all, of the enhancements to Antihypertensive and Lipid Therapy data from 2006 were retained, Aspirin / Clopidogrel Therapy items were again collected, as was the expanded Smoking Status item of Current, Past or Never. Eye and Foot data items, as collected in 2004, returned. Also as in 2006, The Brief Case-find for Depression [BCD] and two items on Psychiatric Treatment / Counseling – Current {Yes/No} and Previous {Yes/No}, previously collected, were not included (but were collected in ANDIAB2 2010). The *new* data issue relevant to ANDIAB 2009 was the decision to collect information on specific Diabetes Tablet Therapies and was retained in 2011.

The previously created separate data collection 'Paediatric/Adolescent' form for individuals aged eighteen years or less, containing data items of most relevance to them, was not utilized, as Specialist Paediatric sites did not participate in 2011.

Thus, the only *enhancement made to the dataset in 2011* was the addition of the following data items eGFR>60 {Yes/No}, and eGFR Result.

The previously created form sent to each participating site requesting Upper Limit of Normal Data for HbA1c and Microalbumin/Protein [and Units] was again utilised – enabling these data to be entered once into the central database. [*This successfully produced 100% HbA1c Upper Limit data - but still less than completely analysable Microalbumin data, as forms did not always contain the Units relevant to the result provided in order to apply the Upper Limit obtained from that site*].

In ANDIAB 2011, seven sites provided data from in-house databases, however, no sites provided data from ANDIAB Software. One strategy undertaken previously by several ANDIAB sites had been to use ANDIAB Software in order to complete an 'annual review' on several [rather than all] patients per clinic, which would enable their site to build up their database over time, and remove one of the perceived burdens of ANDIAB – the need to complete forms on all [or almost all] patients seen in the one month survey period. Four sites provided data from ANDIAB Software in 2002 and nine in 2004, but just one in 2006. It had been hoped that as more sites use this tool, the potential existed to extract data more frequently and provide comparative audit reports, perhaps again on an annual basis. This goal could still be achieved as more sites develop in-house databases from which an ANDIAB data extract can be obtained. It is apparent that use of ANDIAB software waned and has now ceased, likely due in part to the fact that it was never designed to be a day-to-day patient management database solution. Clearly however, the majority of sites *still* do NOT have a database from which they can extract ANDIAB data.

NADC-ANDIAB 2011

Australian National Diabetes Information Audit & Benchmarking

FINAL REPORT

This report details the analysis of demographic, clinical and outcome data of people referred to specialist diabetes services, collected over a one-month period, or for a period of 2011 provided from in-house databases. The results build on those from the inaugural data collection in 1998 and the subsequent 1999, 2000, 2002, 2004, 2006 & 2009 collections. Notification of receipt of funding for ANDIAB from the Australian Government Department of Health and Ageing was received late in 2010 enabling ANDIAB 2011 to proceed.

The report was prepared on behalf of the NADC by A/Prof Jeff Flack and Prof Stephen Colagiuri [Diabetes Centre Bankstown-Lidcombe Hospital and Boden Institute of Obesity, Nutrition and Exercise, The University of Sydney respectively].

Background

The National Association of Diabetes Centres [NADC], who conducted this initiative, is a national collective of over 60 Diabetes Centres brought together by a common desire to see improvement in the standard of diabetes care in Australia.

The NADC was established as a joint initiative by the Australian Diabetes Society and the Australian Diabetes Educators' Association after considering the outcomes of the Diabetes Control and Complications Trial (DCCT). The DCCT found that maintenance of good glycaemic control significantly reduces diabetes related complications in individuals with Type 1 diabetes, and recognised the role of multidisciplinary teams in the provision of specialist care for those people requiring intensive treatment. Subsequently the United Kingdom Prospective Diabetes Study (UKPDS) showed that maintenance of good glycaemic and blood pressure control, through a team approach, in people with Type 2 diabetes, reduced the long term complications of the disease.

As a consequence, the NADC was created to establish and promote effective health care practice and ultimately achieve better outcomes for people with diabetes. In particular, key strategies were identified including the development of standards of care and quality review initiatives, information provision, and training and support for health professionals in specialist multidisciplinary settings.

What is a Diabetes Centre?

A Diabetes Centre is a specialist unit made up of a team of health professionals dedicated to the care of individuals with diabetes. The key functions of a Diabetes Centre are:

- patient education;
- medical treatment and clinical care of people with diabetes;
- providing training in diabetes care to other health professionals;
- providing a support and advisory service to people with diabetes and their non-specialist health professionals; and
- research into medical, scientific, social and behavioural aspects of diabetes.

Over a period of over 30 years now, Diabetes Centres have been established across Australia and now number well over 60 nationwide. They can be found in most major metropolitan adult and children's hospitals and usually have a close working relationship with primary health care providers, ie. local general practitioners and community health staff.

Diabetes Centres are an important component of the range of health care services available to people with diabetes. Whilst Diabetes Centres vary in their make up most will have on site:

- ***endocrinologists*** who provide specialist medical management, treatment and advice to people with diabetes;
- ***diabetes nurse educators*** who provide individual and group patient education, counseling and support services, and specialise in the clinical and nursing care of people with diabetes;
- ***dietitians*** whose job is to assess the individuals nutritional needs and provide advice and an appropriately tailored eating plan to suit the person's physical needs and help promote good health and good diabetes control; and
- ***podiatrists*** who specialise in assessing and treating diabetic foot problems as well as providing foot care education to individuals and groups.

Diabetes Centres are often referred to as *Diabetes Ambulatory Care Centres.* This is because most of the services provided by Diabetes Centres are conducted on an outpatient basis. However, the treatment and education of people with diabetes who are admitted to hospital, and in-service training for hospital staff are also important functions of Diabetes Centres.

Who will access a Diabetes Centre?

Most patients are referred to Diabetes Centres by General Practitioners in order that their patients receive specialist assessment and treatment. Given this role, it is important to recognise that it is most likely that people attending Diabetes Centres will be those whose diabetes is less likely to be managed well. In considering the outcomes of this data collection, it is important to remember that whilst Diabetes Centres will provide assessment and treatment, ongoing responsibility for management of most people remains with the individual and their general practitioner.

Therefore, patients with diabetes referred to specialist diabetes services including Diabetes Centres and specialist endocrinologists in private practice [who are the subject of this report], are likely to be those with newly diagnosed disease requiring education, and those with uncontrolled diabetes or complications of the disease requiring specialist assessment and management. As such the latter patients, in particular, likely represent those individuals with more complex or complicated diabetes.

Introduction

There has been long standing worldwide interest in attempting to define suitable diabetes datasets and in methods of data collection to reflect appropriate diabetes outcomes. As a result, collection, analysis and reporting of standardised diabetes datasets is now widely practised. The European Association for the Study of Diabetes [EASD] Study Group DO IT [Diabetes care Optimisation through Information Technology][1] undertook much work aimed at improving the quality of diabetes care through the appropriate use of information technology, including promoting the collection, analysis and reporting of the DiabCare dataset[2,3] for audit and benchmarking purposes. From this has come the DiabCare Q-Net initiative[4].

A similar initiative in Australia, in September 1993, was the NSW Diabetes Outcomes Workshop [NDOW], sponsored by the NSW Health Department as one of its Health Outcomes Funded Projects[5,6]. Forty five diabetes health professionals, Health Department officials and consumers met for a one day workshop and agreed on a dataset of 59 health outcome data elements that covered demographic, acute and chronic complications and self care practice areas of diabetes care. These items became known as the NDOW dataset, and subsequently these data items have become widely promulgated for collection [using standardised definitions] across Australia.

In 1997 the Australian Diabetes Society [ADS] Council accepted a recommendation to adopt the NDOW dataset as its Diabetes Outcomes dataset, and formed a sub-committee {now named the National Diabetes Data Working Group [NDDWG]}. This sub-committee managed the dataset and promoted quality diabetes care in Australia, through the National Diabetes Outcomes Quality Review INitiative, [NDOQRIN]. The NDDWG has taken a subset of the NDOW dataset and has promoted its collection as a minimum dataset (for quality diabetes care) in a variety of clinical practice settings.

Diabetes was named the 5th National Health Priority Area in 1996. Work followed to improve diabetes care in Australia including the commissioning of the National Diabetes Strategy to update and replace the National Action Plan. One aspect reviewed was that of the recognised need for local data on which appropriate planning could be carried out and assessment of the effect of initiatives could be undertaken. Consequently, several initiatives indicated the need for reliable data in Australia [including diabetes indicators work], as noted in the National Health Priority Areas Report: Diabetes Mellitus 1998[7]. However data on clinical aspects of diabetes, including outcomes data, were deficient in Australia as highlighted in The National Diabetes Strategy and Implementation Plan report (Colagiuri et al)[8].

The NDDWG continued to promulgate the NDOQRIN dataset, and in 2002 was successful in having it accepted as the first clinical dataset to be included in the National Health Data Dictionary and Knowledgebase, Version 12. This dataset has since been enhanced, and is now online as part of the AIHW – Metadata Online Registry ['METeOR'] as the Diabetes (clinical) Data Set Specification at – [see AIHW website]:
http://meteor.aihw.gov.au/content/index.phtml/itemId/304865

This ANDIAB 2011 report highlights the results of the collection, collation, analysis and audit of clinical diabetes data collected in specialist diabetes practice settings. This collection was held mid-year, as with many previous audits, and results will be discussed at the next National Association of Diabetes Centres Annual General Meeting [NADC AGM] at the Gold Coast, August 2012. The findings of ANDIAB 2011 will be submitted for presentation at the Australian Diabetes Society / Australian Diabetes Educators Association Annual Scientific Meeting at the Gold Coast [August 2012], as has been the practice previously in reporting ANDIAB collection data [eg 2009 findings [9]].

1. Methodology

At its Annual General Meeting in Canberra [Oct 1997], the National Association of Diabetes Centres [NADC] proposed that a one month data collection be undertaken [in March 1998], using the minimum dataset defined by NDOQRIN. This dataset, managed by the NDDWG, contains demographic, clinical, biochemical and outcome data items, and, as stated above, has been proposed for collection in a variety of clinical practice settings in Australia including primary care[10,11], see below [The Dataset].

Following the success of the 1998 collection, the recommendations [a] to make this an annual quality exercise, and [b] to change its name to **Australian National Diabetes Information Audit & Benchmarking "ANDIAB"** [*as this title/name better reflected the purpose and nature of the data collection and its report*] were adopted, and the second survey was undertaken in 1999. The survey format was undertaken again in March and/or April 2000. It was thence decided to make this a biennial activity. A successful application for the ADPO Project, established to administer a Novo Nordisk Grant, resulted in the development of ANDIAB Software in 2001/2002. ANDIAB collections have been biennial since 2000, however notification of receipt of funding for ANDIAB from the Australian Government Department of Health and Ageing was received late in 2008 precluding a collection that year. Thus ANDIAB 2009 was undertaken in May/June 2009 with Software sites submitting their data extract in June/July/[August]. ANDIAB 2011 was also undertaken in May/June 2011 with Software sites asked to submit their data extract in June/July/[August].

1.1 The Dataset:

The NDOQRIN diabetes dataset has considerable compatibility with similar international datasets including the DiabCare dataset. The NDOQRIN dataset was enhanced and used as the basis of this national initiative, aimed at improving diabetes care through a structured approach to patient management. This was achieved by linking the minimum dataset to the NSW Clinical Management Guidelines for Diabetes[12], thence enhanced over the years. This minimum dataset is suitable for use in primary care [where it is known as the 'Recommended GP Subset of the NDOQRIN Dataset'], Specialist practice and Diabetes Centre settings. It has been developed in a scannable format (see below [The Software]) as a single page with required written data kept to a minimum, most fields being yes/no or other choice options.

For the 2009 collection, after suggestions from the Diabetes Centres and specialists who have participated previously were considered, as well as experience from the 2006 Diabetes Collaborative Project, six new data elements were added to the survey data collection form and several were removed from the 2006 form. The 2009 dataset was used in 2011 with the addition of just two new fields related to eGFR [see What's New? (E) above for more detail]:

[1] addition of eGFR>60 {Yes/No}; and
[2] addition of eGFR Result.

The separate Paediatric/Adolescent form designed specifically for patients with diabetes who were aged eighteen years or less, was not used (since there were no Paediatric Sites participants and thus no Paediatric data collected in 2011).

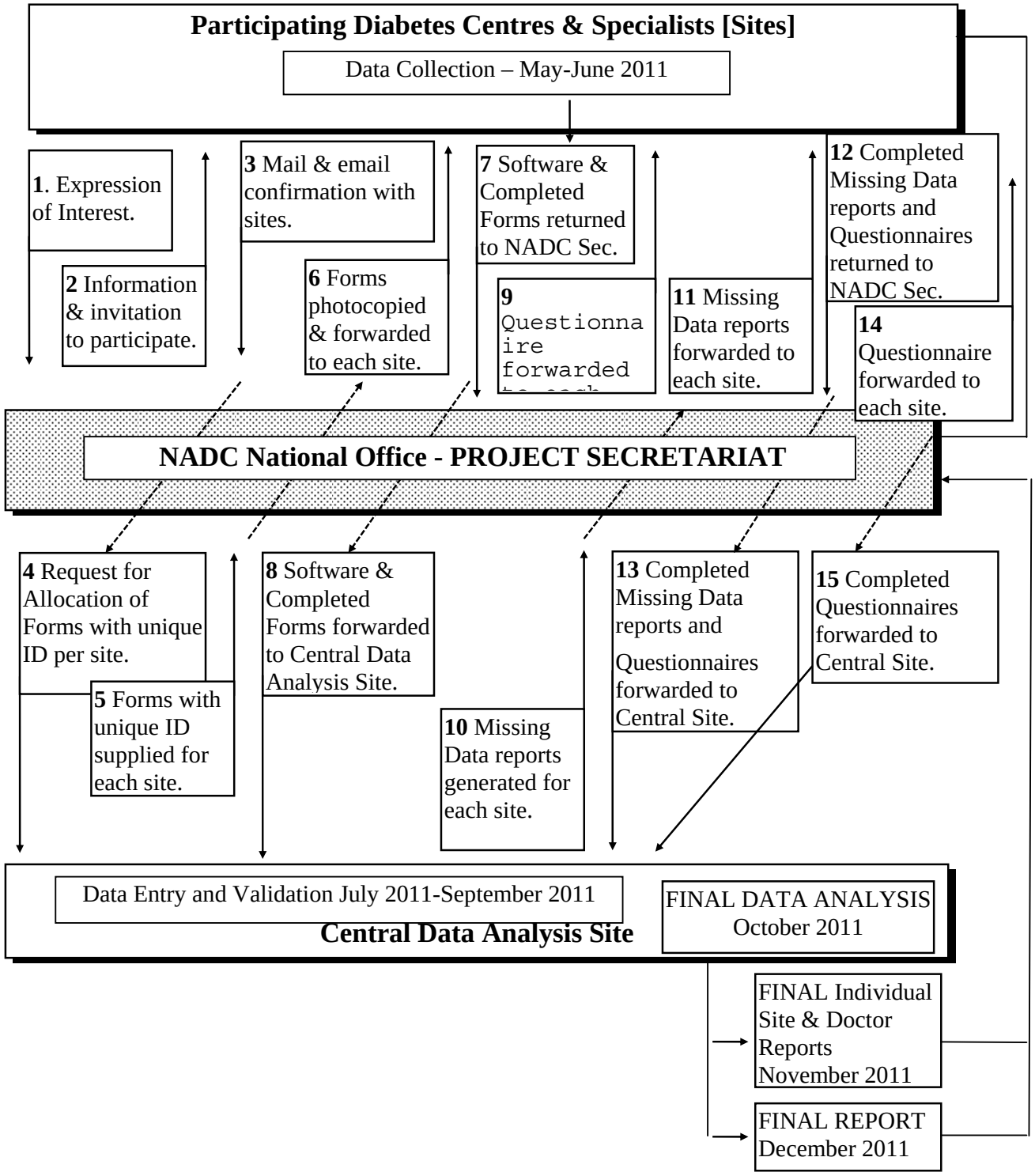
The scannable form is one page in length.

Definitions for each data field, including all valid field types, were printed on the reverse side of the forms, ***[Appendix 1 Copy of Forms].*** The data dictionary [indicating field type, size and transfer protocol requirements], was updated with the above changes and made available to sites contemplating electronic data transfer from in-house databases, (available on request to the NADC Secretariat).

NADC-ANDIAB ***Figure 1***

Australian National Diabetes Information Audit & Benchmarking

National Clinical Data Collection Project



1.2 The Software:

An application of Teleform© scannable/faxable software was integrated with a Microsoft Access 97© database running under a Windows NT© operating system[13, 14.] The Teleform© Designer module allows paper forms to be designed and printed (or faxed out). Once completed, forms can be scanned (or faxed back). The Teleform© Reader module assesses each form and either accepts the form (transferring data to an intermediate Access© data file), or suspends the form for verification of one or more data items that the Reader software cannot confidently identify. The Teleform© Verifier module allows an on screen version of the scanned (or faxed) image to be viewed, and corrections made where necessary. Once such corrections are made and accepted, data from these forms are also transferred to the intermediate file. Data in this file are then appended to the permanent database file. Current Operating System and Software Versions are Windows XP, Access 2003 & Teleform V10.4.1

The software has been written to allow individual practitioners or sites (eg a Diabetes Centre) to be registered, and for unique forms to be generated for completion by that practitioner (or site). Two single page scannable forms were designed for data collection using the Teleform© software [Adult and Paediatric/Adolescent]. Completed data once returned are then allocated to that practitioner. A suite of reports has been developed and attached to menu buttons on a user-friendly interface to enable data reporting. These include data verification reports, patient data reports, pooled practice reports and comparative audit reports (see below pp 8-10).

ANDIAB Software is a Microsoft Access © application available in Access 97 or Access 2000 formats. It includes an extract program, which produces a de-identified ANDIAB extract of data for all individuals seen in the previous 12 months. The data extract file is readily incorporated into the Central database for collation and analysis along with scanned form data.

Data were stored and analysed in the *Central ANDIAB Database*, a Microsoft Access© database held in password protected files on computers stored in a locked room. In 2009, twelve Centres provided data in electronic format from in-house databases via email and all other sites used the scannable form. No sites provided extracts from ANDIAB Software in 2009.

As in previous years, the Central Data Analysis Site [Benchmarking Centre] at the Bankstown-Lidcombe Diabetes Centre in Sydney pooled, verified, analysed and reported the data.

The Commonwealth funded ANDIAB Project 2009-2010 provided funds for ANDIAB 2009 [plus an ANDIAB2 collection in 2010] *and* for the ANDIAB database application to be completely overhauled. This happened progressively and resulted in several enhancements in the way reports are generated, giving us the ability to provide participants with complete electronic as well as hard copy reports – [the former having not been previously possible]. Further enhancements have been implemented in 2011 using ANDIAB Project 2011-2012 funding.

1.3 ANDIAB Coordination:

The NADC Secretariat coordinated ANDIAB, which was conducted in a 'double blind' fashion, [Figure 1]. Diabetes Centres and specialist endocrinologists in private practice were invited to complete the one-page data collection forms during the month of May [or at some sites, June] 2011. Centres with computerised databases or those with paper form collection of the dataset [or the majority thereof], could choose to provide the data electronically. Centres or individual specialists, who wished to participate, responded to the formal invitation distributed by the NADC Secretariat to all Diabetes Centre members of the NADC. All subsequent contact and correspondence with participants was conducted through the Secretariat.

The Secretariat allocated a unique code to each Diabetes Centre and participating specialist endocrinologist using a predetermined proforma, and held the only copy of the code. Sites who

have participated previously used the code previously allocated. The Central Data Analysis Site generated 'Master Copies' of forms uniquely numbered for each site and/or doctor, and sent them to the NADC Secretariat, which forwarded them to each site where copies were made.

The major Project Milestones are summarised in **Table 1** and superscript numbers reference **Figure 1** Project components.

Table 1 – ANDIAB Project Milestones*

- Revise ANDIAB Dataset[0];
- Initial call for expressions of interest, January 2011[1];
- Formal invitations received, collation of site acceptances February 2011 - March 2011[2];
- Allocation of site codes, March 2011[3, 4];
- Generation and distribution of Data Collection Forms, April 2011[5, 6];
- Data collection, May - June 2011[7, 8];
- ANDIAB assessment: Post Data Collection Questionnaire[9, 12];
- Data received from ANDIAB Software sites June 2011 - July 2011[8];
- Data entry and validation July 2011 – September 2011;
- Missing Data reports forwarded to sites July 2011 – September 2011[10, 11];
- Integration of returned missing data September 2011[12, 13];
- Final Data Analysis October 2011;
- Draft Pooled Data Report October 2011;
- Final Site/Doctor Data Analysis Reports forwarded to sites November 2011;
- Final Pooled Data Report December 2011;
- ANDIAB assessment: Site Report Assessment Questionnaire[14, 15].

*: See also Figure 1

1.4 Participants:

44 Diabetes Centres and 4 specialist endocrinologists in private practice expressed an interest in participating. Data were received, processed, analysed and are reported here, from 42 sites, 39 Diabetes Centres & 3 specialist endocrinologists in private practice [**Table 2**]. Seven Centres provided data from in-house databases, the remainder [35] used paper forms; [none provided data from ANDIAB Software].

State and Territory breakdown was: NSW 17; Vic 10; Qld 10; Tas 2; SA 1; WA 1; ACT 1;.

Table 2 – Participating Sites

Acacia Ridge Diabetes & Family Medicine Clinic	Newcomb Diabetes Outreach Clinic- Barwon Health
Austin and Repatriation Medical Centre- Diabetes Centre	North Lakes Health Precinct- Diabetes Team Metro North Health Service
Ballina Community Health-Ballina Byron Diabetes Centre	North West Diabetes Service
Bankstown-Lidcombe Hospital - Diabetes Centre	Princess Alexandra Hospital - Dept of Diabetes
Barwon Health - Geelong Hospital - Diabetes Centre	Queanbeyan Community Health- Queanbeyan Hospital
Blacktown - Mt Druitt Hospital	Redland Hospital Diabetes Centre
Cairns Base Hospital - Diabetes Centre	Rockingham Diabetes Services – Rockingham Hospital (former Park Diabetes Services)
Clarence Diabetes Service	Royal Hobart Hospital - Diabetes Centre
Frankston Hospital	Royal Melbourne Hospital - Diabetes Centre
Gold Coast Hospital - Diabetes Centre	Royal Prince Alfred Hospital - Diabetes Centre
Goulburn Valley Health - Goulburn Valley Base Hospital	St John of God Hospital Bendigo
Goulburn Valley Health - outreach clinics	St Vincent's Hospital Sydney - Diabetes Centre
Greater Newcastle Cluster Diabetes Service	Sunshine Coast Diabetes Centre
Hastings/Macleay Diabetes Service	The Alfred - Department of Endocrinology & Diabetes
Ipswich Diabetes Service	The Canberra Hospital - Diabetes Centre
Lismore & Districts Diabetes Centre	Townsville Hospital - Diabetes Centre
Liverpool Hospital Diabetes Centre	Tweed Valley Diabetes Service
Logan Beaudesert Health Service District	Westmead Hospital - Diabetes & Endocrinology Ambulatory Care Centre
Lyell McEwin Hospital	
Monash Medical Centre	

Mt Druitt Hospital - Diabetes Centre	
Participating specialist endocrinologists : Dr M Datyner, Dr A McElduff and Dr B Tuch.	

Specialist endocrinologists could participate in one of two ways:

[i] as part of a Diabetes Centre receiving either a 'pooled' report for all doctors, or an individual report covering patients seen by each doctor [identified uniquely within that Centre]; or

[ii] as an individual specialist in private practice independent of a Diabetes Centre.

1.5 Data Verification and Validation:

As in previous years every effort was made to ensure data completeness and correctness, with specific 'validation reports' generated for each site [**Table 3**].

Thus, attempts were made to provide sites with the opportunity to improve their data with the generation of these specific reports containing lists of missing or potentially invalid data, as well as possible duplicate individual entries. These were forwarded to the sites through the NADC Secretariat and returned to the central site once reviewed. In 2011, 31 sites returned Validation Reports. All additional or corrected data items were entered / corrected respectively, in the pooled database, prior to final data analysis. For duplicate data, where duplicates were identified, these were reviewed and the *first* entered record retained, *supplemented* by any additional data in the second record that was missing in the original. The *second* entered record was then deleted.

Table 3 - Specific Reports

[a] ***Missing Vital Data Fields*** :

A list was generated of all instances of missing data in any of the following fields :

Sex; Date of Birth; Year of Diagnosis; Diabetes Type;
Diabetes Management; Height; Weight; Initial Visit; Fasting Status if Lipids.

[b] ***Potentially Invalid Data Values*** :

A list was generated to check potential data inaccuracies as follows :

[1] Male = Pregnant OR Female <15 or > 50 = Pregnant;
[2] Type 1 and Treatment []] = Diet or Tablets;
[3] GDM and] = Tablets;
[4] Year of Diagnosis or Year Started Insulin < Date of Birth;
[5] On Insulin Since Year < Date of Diagnosis;
[6] Systolic BP is < Diastolic BP OR Systolic or Diastolic is missing;
[7] Systolic BP < 70 or > 200 OR Diastolic BP < 40 or > 130 mmHg;
[8] Age >14 and Height < 1.3 Metres or > 2.0 Metres;
[9] Age >14 and Weight < 40 Kilograms or > 150 Kilograms;
[10] BMI > 50 OR Age >14 and BMI <15;
[11] Type 1 and On Insulin Since Year ≥ 3 years after Date of Diagnosis;
[12] Age < 20 and On anti-hypertensive therapy;
[13] Age < 2 [check Date of Birth is correct];
[14] Female with erectile dysfunction;
[15] Stated to be On Ezetrol AND On Vytorin.

Whilst some of these *may* be possible (eg 7, 8, 9, 12), they most probably represent incorrect data recording or interpretation by the computer system.

[c] ***Possible Duplicates*** : (double individual registration / data entry), based on Sex and Date of Birth match – (or on an ID match with significantly different data).

[d] ***Potentially Incorrect Haemoglobin A1c, Lipid, and Creatinine Values*** : HbA1c <3.5, Cholesterol <2.0, HDL Cholesterol >2.5, Triglyceride <0.5, Creatinine <50 or >1000.

[e] ***Visual Acuity - Blindness & Creatinine – Renal Failure Checks*** :

The reported results and status (respectively) were cross-checked to question likely or possible errors (eg V/As <6/60 recorded as Blind or High Creatinine/not ESRD).

1.6 Data Assumptions / Decisions / Data 'Manipulation' :

In analysing the data, as in previous years, the following data assumptions, decisions and data 'manipulations' were made using the following 'rules':

Missing data were also calculated conditionally where relevant:

- (Pregnancy Yes/No, for female only), (Erectile Dysfunction Yes/No for male only);
- (On Insulin since-Year, only if on Insulin);
- (Fasting Yes/No, only if Lipids recorded);
- (HbA1c/Microalbumin range, only if HbA1c/Microalbumin value recorded);
- (Microalbumin units, only if Microalbumin value recorded);
- (Paediatric/Adolescent fields based on Form Level [ie fields only on that form]). ***[N/A in 2011]***

Clearly invalid data were excluded:

- (Date Of Birth > today, if not corrected after site questioned);
- (On insulin since year, if not on insulin);
- (Pregnancy for males or females age <15 or >50), (Erectile Dysfunction for females).

Data 'manipulations' were necessary:

- Visual Acuity was rounded *up* to the next valid level [6/4 → 6/5; 6/30 → 6/36];
- Visual Acuity [a]<=6/60 in both eyes and Blindness = Yes {New &/or Past} Yes was/were changed to No and [b] >6/60 in either eye and Blindness New and Past = No, Past Blindness was changed to Yes [in line with the Blindness Definition] if not corrected after site questioned;
- In instances where Retina reports contained both Diabetes Abnormality and Non Diabetes Abnormality, given the ability to record (and report) one only, the Diabetes Abnormality was recorded and reported;
- Both 'Year of Diagnosis' and 'Insulin Since' results were deleted if < Date Of Birth;
- The 'On Anti Lipid Rx' result was changed from Yes to No, if no further Lipid Rx details were provided;
- If Age >= 20 and Site = Paediatric, then we changed the record to 'Adult'; ***[N/A in 2011]***
- Changed 'Diet Only' from Yes to No if other Management Methods details were provided;
- HbA1c and Microalbuminuria/Proteinuria were only considered in relation to range calculations when range [*and* units (microalbuminuria/proteinuria)] were stated;
- If Type 1, but insulin was commenced >3 years after diagnosis *and* age at diagnosis was ≥ 40 *and* BMI was ≥ 25, they were changed to Type 2;
- HDL recorded as > 4.0 after site checks, and HbA1c values < 3.5 after site checks were excluded from analyses.

1.7 Site Data Reports:

Pooled data analysis addressed the process and outcome findings for all data fields, to enable individuals/sites to compare and benchmark their practice findings against other participating individuals/sites. These reports were generated for each site and doctor [when requested], providing them with comparison data for their site / practice versus all other sites. These were generated for all Adult Forms sites and the specialist endocrinologists in private practice combined, (*and excluding the Paediatric Forms data, and just for Paediatric data for the Paediatric sites)* ***[N/A in 2011].*** Each doctor with over 8 patient's data received a report.

These reports included:

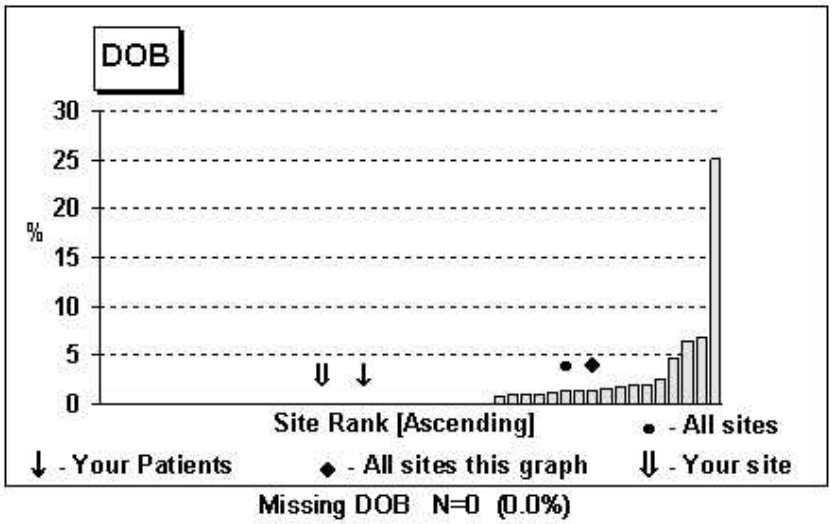
- 4 to 6 year Comparative Data [for sites to compare results to those from previous year(s) participation] :
    - ◊ A Patient Outcomes Summary report, plus a Your site versus all others comparison;
    - ◊ A Missing Data Analysis report; and
    - ◊ A Frequency Counts report.

- Summary Data:
  - ◊ A 3-page 'Guidelines' Report;
    *based on the NSW Clinical Management Guidelines for Diabetes[12], modified with additional NHMRC Type 2 Diabetes Guidelines Targets where relevant.
- Outcome measurements :
  - ◊ Frequency Counts Data;
  - ◊ Mean Descriptive Results and Outcome Data.
- Process assessment :
  - ◊ Missing Data [presented in both tabular and graphical formats].

In response to feedback requests dating back to 1999, as in other subsequent years, each section also contains a worked example explanatory page. In instances where individual doctors were identified within a Diabetes Centre site, their individual doctor report included a comparison of their data versus all other sites, including the remainder of their site *minus* their data (here- zero missing) [see **Figure 2** – Data for Adult Sites only]. In addition, the diamond [♦] represents the Total Missing result for Adult data only, & the dot [•] represents the Total Missing for Adult AND Paediatric [ie All sites] data.

FIGURE 2

[Example of Individual Doctor – Adult Sites only Missing Data Report Graph]



1.8 Pooled Data Report:

As in previous years, this final analysis report of pooled data follows the pattern of the individual site reports, with 3 analyses having been undertaken:

- Pooled Data - All Sites
- Pooled Data - Adult **Forms** only
- Pooled Data - Paediatric/Adolescent **Forms** only

NOTE: ***This is different to 1998 & 1999 where comparisons with Adult Sites and Paediatric Sites were undertaken.***

Unless otherwise stated, results are reported as the percentage of the total patient group.
[ie for example, in an instance with 10% Yes, 79% No and 11% Missing - we would report 10% = Yes (not 11.3% = Yes, which is of those who had responded Yes or No)].

1.9 Questionnaires:

In 2011, only three sites provided data from established databases, with paper form collection used by the majority of participants. Participating sites were asked to complete the first of two questionnaires in June/July/August, - [at completion of the data collection phase], to assess the project overall, the other [to assess the individual site/doctor report[s] that they receive] will be forwarded in December/January with their Site Report. See 2.6 & Table 17 Page 25.

[See Appendix 2 Copies of Questionnaires used in 2011].

2. Findings / Results

2.1 Introduction:

There were data provided on a total of **4629** individuals, all Adult Forms [as in 2004 and 2006 where *all* Forms were from Adult Centres and Specialist Endocrinologists, with no Paediatric Forms in 2011]. Some individuals under age 19 attending Adult Centres were seen and an Adult Form completed. There were 3329 Paper Forms and 1300 Electronic records.

2.2 Demographic Data:

Table 4 contains basic demographic data. Results are expressed as either Percentage [%] or Mean ± Standard Deviation (SD). Appendix 3 shows Frequency Tables for n= and range data.

Table 4 – Demographic Data

	All % - n = 4629	All % - n = 4629	Paediatric % - n = 0
Age[Years]		57.2 ± 17.3	
Sex [%] - Male		53.5%	
DM Duration [Years]		13.9 ± 10.6	
Diabetes Type			
Unstated		1.3%	
Type 1		22.7%	
Type 2		72.5%	
GDM		1.9%	
Other		0.3%	
Pregnant		2.4%	
Treatment			
Unstated		3.4%	
Nil		0.0%	
Diet Only		4.8%	
Tablets		26.9%	
Insulin		35.6%	
Insulin & Tablets		29.2%	
BMI [kg/m²]			
All Patients		31.3 ± 7.5	
Type 1		26.6 ± 6.2	
Type 2		32.8 ± 7.4	
GDM		31.9 ± 7.0	
Initial Visit		14.2%	

As can be seen, there was a preponderance of males overall, the mean age was 57.2 ± 17.3 years for these Adult Forms patients, mean diabetes duration for these Adult Forms patients was 13.9 years. Patients were predominantly Type 2 individuals [72.5%], with Type 1 [22.7%].

2.3 Categorical Data Summaries:

Table 5 gives a breakdown of overall mean categorical data ± (SD) for BMI, Blood Pressure, Lipids and Blood Glucose Control. Appendix 3 shows Frequency Tables for n= and range data.

Table 5 - Overall Mean Data

* (mmol/L)	All - n = 4629	Adult - n = 4629	Paediatric - n = 0
BMI [kg/m²]		31.3 ± 7.5	
BP (mm Hg)		130 ± 18 / 74 ± 10	
Cholesterol *		4.3 ± 1.1	
HDL Cholesterol *		1.2 ± 0.4	
Triglyceride *		1.8 ± 1.5	
LDL Cholesterol *		2.2 ± 0.9	
LDL_CALC *		2.2 ± 0.9	
LDL_ALL *		2.2 ± 0.9	
HbA1c (%)		8.1 ± 1.7	

[LDL is as Reported or Calculated [CALC] from available lipids if no LDL Reported. ALL uses CALC if LDL not Reported]

Tables [6-8] detail Risk Factors, Complications and Current Status Data. As noted on Page 10, these data are reported as the percent 'Yes' of the total patient group including urinary albumin/protein [Table 8]. As stated however, the data on lipids & obesity [Table 6] represent the percent of those where the test/procedure was done (marked by a double asterisk**)[eg 3.5% *of those with a cholesterol result* had a level >6.5, NOT 3.5% of ALL patients].

Table 6 collates data relating to Risk Factors [n= represents All Sites data, others are % only].

Table 6 - Risk Factor Data

Risk Factors		[All n] ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
Current Smokers		457		9.9%	
Past Smokers		1088		23.5%	
Never Smoked		1830		39.5%	
On Antihypertensive Therapy		2637		57.0%	
Hypercholesterolaemia **	>6.5	124 / 3526		3.5%	
	5.5-6.5	317 / 3526		9.0%	
	5.0-6.5	664 / 3526		18.8%	
Hypertriglyceridaemia **	>4.0	187 / 3487		5.4%	
	2.0-4.0	877 / 3487		25.2%	
Reduced HDL Cholesterol **	<1.0	846 / 3067		27.6%	
Raised LDL **	≥2.5	994 / 2884		34.5%	
On AntiLipid Therapy		2786		60.2%	
Over Wt / Obese Type 2 **	>27 kg/m²	2353 / 2945		79.9%	

[** These figures represent the % of the total who had the test/procedure - ie excluding the missing values]

Table 7[a] collates the data relating to Complications/Events in the last 12 months [n= represents All Sites data, others are % only].

Table 7[a] – Complications/Events in the Past 12 Months

	[All n =] ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
Severe Hypoglycaemia	220		4.8%	
Myocardial Infarct	185		4.0%	
CABG/ Angioplasty/ Stent	125		2.7%	
Cerebral Stoke	74		1.6%	
End Stage Renal Disease [ESRD]*	18		0.4%	
Lower Limb Amputation	33		0.7%	
New Blindness	40		0.9%	
Erectile Dysfunction [%males] *	52		2.1%	

*This represents those with ESRD or Erectile Dysfunction [in last 12 months] = Yes AND ESRD or Erectile Dysfunction {ED} [developing *Prior* to the last 12 months] = NO-{*ie those likely to have developed it recently, not developed it previously & still have it -[Yes last 12 months AND Yes Prior]. In this regard we excluded those with Yes in the last 12 months and Missing (Prior) - ie ESRD=5 and ED=13. If these are included the respective **Adult** % would be ESRD 0.5% and ED 2.6%}.*

Table 7[b] collates the data relating to Complications/Events prior to the last 12 months, [n= represents All Sites data, others are % only]. {Data NOT collected on Paediatric Forms-N/A}.

Table 7[b] – Complications/Events prior to the Past 12 Months

Complications / Events	[All n] ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
Myocardial Infarct	407		8.8%	
CABG/ Angioplasty/ Stent	440		9.5%	
Cerebral Stoke	196		4.2%	
End Stage Renal Disease [ESRD]	110		2.4%	
Lower Limb Amputation	97		2.1%	
New Blindness	47		1.0%	
Erectile Dysfunction [%males]	560		22.6%	

Table 7[c] collates data relating to the percent of individuals with ANY complications/event **[i.e. occurring during, OR prior to the last 12 months, or Both, counted once only]** [n= represents All Sites data, others are % only].

Table 7[c] - Any Complication/Event[during &/OR prior to the Past 12

Complications / Events	[All n] ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
Myocardial Infarct	555		12.0%	
CABG/ Angioplasty/ Stent	537		11.6%	
Cerebral Stoke	238		5.1%	
End Syage Renal Disease [ESRD]	125		2.7%	
Lower Limb Amputation	107		2.3%	
New Blindness	59		1.3%	
Erectile Dysfunction [%males]	625		25.2%	

Table 8 collates the data relating to Current Data in the last 12 months, [n=represents All Sites data, others % only].

Table 8 – Current Data [and Previous Foot Ulcer History]

Complications	[All n] ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
Current Foot Ulcer	98		2.1%	
Active Foot Lesion	116		2.5%	
Previous Foot Ulcer History	256		5.5%	
Peripheral Vascular Disease	540		11.7%	
Peripheral Neuropathy	1013		21.9%	
Microalbuminuria #	608		13.1%	
Macroalbuminuria #	277		6.0%	
Proteinuria > 300 mg/24hr #	24		0.5%	

[# **These figures represent the % or the Total Patient Group**
(**NB** *This was mislabeled in previous ANDIAB Reports as the % of the total where the test/procedure was done (ie excludes missing)* - See Table 16 Page 23 for these data].

Whilst there are some differences, the majority of these data are similar to findings in 2009 [and other previous collections] (***Appendix 7***), indicating these data are providing a relatively consistent picture of the clinical status of individuals attending specialist diabetes services.

Major findings compared to 2004, 2006 & 2009 data were for 'Any' Myocardial Infarction (Prior to OR in the last 12 months) [9.0% in 2004, 12.8% in 2006, 10.4% in 2009], and CABG [10.8% in 2004, 12.6% in 2006, 9.8 in 2009]. In 2011 the respective percentages were similar to 2009-12.0% and 11.6% respectively. Also, there were similar reported levels of Antihypertensive use – 57.0% [versus 56.4% in 2004, 55.4% in 2006 and 52.2% in 2009] but increasing Lipid Therapy use 60.2% [versus 41.0% in 2004, 52.0% in 2006 and 52.9% in 2009], compared to previously, suggesting sustained increased use. These findings are interpreted in the face of significant Missing Data for Myocardial Infarction and CABG in 2011 (12.7-26.6% versus 5.8-9.9% in 2006) [*see Note [1] Discussion & Executive Summary*].

Selected data from the above Tables show [in patients attending specialist diabetes services]:

Table 6
- 9.9% [10.3% Adult Forms in 2009] are current smokers,
- 57.0% [52.2% Adult Forms in 2009] are on antihypertensive therapy, and
- 79.9% [77.2% in 2009] Type 2 individuals overweight or obese [BMI > 27kg/m^2].

Table 7 [a][b][c]
- 4.8% [3.2% Adult Forms in 2009] had a severe hypoglycaemic episode, and with regards to complication/event fields (prior to the last 12mths),
- 22.6% [13.4% Adult Forms in 2009] of males have Erectile Dysfunction, and
- 9.5% [7.7% Adult Forms in 2009] had CABG/Angioplasty/Coronary Stent.

Table 8
- 11.7% [9.8% Adult Forms in 2009] have peripheral vascular disease, and
- 21.9% [18.6% Adult Forms in 2009] have peripheral neuropathy.

In regards to the data in Tables 7 & 8, these data items are only sought from patients ≥ 19 years old [Adult Forms], (but there were no Paediatric/Adolescent Forms) – some younger individuals were reported on Adult Forms. **Note** however that these are reported as the % of the total [Adult] patient group & NOT the % of those where a Yes / No answer was obtained. The relevant percentages for a selection of these are shown below in **Table 7b[1]**:

Table 7b[1] Complications/Events prior to the Past 12 Months [Adult Forms]

	Yes			No		Missing	
	n =	%	%	n =	%	n =	%
Myocardial Infarct	407	8.8%	*12.0%*	2993	64.7%	1229	26.6%
CABG/ Angioplasty/ Stent	440	9.5%	*10.9%*	3603	77.8%	586	12.7%
Cerebral Stoke	196	4.2%	*5.8%*	3195	69.0%	1238	26.7%
End Stage Renal Disease [ESRD]*	110	2.4%	*3.3%*	3242	70.0%	1277	27.6%
Lower Limb Amputation	97	2.1%	*2.6%*	3693	79.8%	839	18.1%
New Blindness	47	1.0%	*1.4%*	3309	71.5%	1273	27.5%
Erectile Dysfunction [%males] *	560	22.6%	*31.3%*	1230	49.7%	686	27.7%

Table 7b[1] shows in *italics*, the higher % Yes values that would be obtained if presented as the % of the Yes/No response group only, and also shows significant NO % values that are of relevance [see Discussion page 42]. As in previous years, for Paper Form data, 'Missing', represents individuals where the item is unavailable or has not been collected.

Note that in 2011, whilst these data are presented as the % of all Adult Data, n=4629 [hence the n= values above], **this analysis is actually only relevant for Paper Form completion**, where Yes AND No data are recorded. The 7 sites that provided data on disk from in-house databases generally only store data on those individuals where an event *HAS* occurred, and this has contributed to the high 'Missing' percentages for most of these items.

Table 7b[2] presents the same analysis for data only from Paper Forms Adult Data sites, [n=3366] - more comparable to the Table 7b[1] analysis from previous ANDIAB collections.

Table 7b[2] Complications/Events prior to the Past 12 Months [Adult PAPER Forms]

	Yes			No		Missing	
	n =	%	%	n =	%	n =	%
Myocardial Infarct	342	10.3%	*10.9%*	2810	84.4%	177	5.3%
CABG/ Angioplasty/ Stent	349	10.5%	*11.0%*	2828	85.0%	152	4.6%
Cerebral Stoke	164	4.9%	*5.2%*	3000	90.1%	165	5.0%
End Stage Renal Disease [ESRD]*	103	3.1%	*3.3%*	3038	91.3%	188	5.6%
Lower Limb Amputation	64	1.9%	*2.0%*	3094	92.9%	171	5.1%
New Blindness	46	1.4%	*1.5%*	3106	93.3%	177	5.3%
Erectile Dysfunction [%males] *	458	25.8%	*29.9%*	1073	60.6%	241	13.6%

NOTE in *italics*, the higher % Yes values obtained if presented as the % of the Yes/No response group only.

Table 7c[2] presents the same analysis again – here for data only from Paper Forms Adult Data sites,[n=3329], for **ANY** Complication/Event[during &/OR prior to the Past 12 Months]

Table 7c[2] ANY Complication/Event during &/OR prior to Past 12Mths [Adult PAPER Forms]

	Yes			No		Missing	
	n =	%	%	n =	%	n =	%
Myocardial Infarct	410	12.3%	*12.6%*	2853	85.7%	66	2.0%
CABG/ Angioplasty/ Stent	441	13.2%	*13.5%*	2829	85.0%	59	1.8%
Cerebral Stoke	206	6.2%	*6.3%*	3064	92.0%	59	1.8%
End Stage Renal Disease [ESRD]*	128	3.8%	*3.9%*	3126	93.9%	75	2.3%
Lower Limb Amputation	83	2.5%	*2.5%*	3187	95.7%	59	1.8%
New Blindness	57	1.7%	*1.7%*	3203	96.2%	69	2.1%
Erectile Dysfunction [%males] *	521	29.4%	*32.9%*	1064	60.0%	187	10.6%

NOTE in *italics*, the higher % Yes values obtained if presented as the % of the Yes/No response group only.

NB – There are NO equivalent analyses for Table 7a - and there is NO Table 7c[1]

2.4 NSW Clinical Management Guidelines for Diabetes:

The NSW Clinical Management Guidelines for Diabetes[12] concentrate on 7 key areas of patient assessment and management, namely Blood Glucose Control, Eyes, Weight, Blood Pressure, Feet, Lipids, and Renal Function. Also NHMRC Evidence Based [EB] Guidelines Criteria where relevant

With regard to these, for ALL data [except Feet (see below)] *:*

Blood Glucose Control:	Page 17 for more detail
Process:	HbA1c – Overall 91.7% of patients had an HbA1c measurement and of these 100% of patients had an HbA1c assay upper limit of normal range [ULN] measurement recorded. Thus in 91.7%, an assessment of the relationship of the HbA1c result to the ULN could be made.
Outcome:	≤**1% above ULN** (30.2%); **1-2% above ULN** (27.2%); **>2% above ULN** (42.6%). *See Table 10 and 10[a] for more results*

Eyes:	Page 18 for more detail
Process:	A total of only 41.0% of patients were recorded as having seen an Ophthalmologist and 38.1% an Optometrist in the last 12 months. [25.2*% had seen either an Ophthalmologist or an Optometrist*]. A total of 65.2% [R] & 65.2% [L] had a retinal assessment recorded. Only 48.6% [R] & 48.5% [L] had a visual acuity recorded.
Outcome:	A total of 25.6% [Right] and 25.7% [Left] & 27.4% [Either or Both] of those with a retinal assessment recorded, had a Diabetes Abnormality. A total of 5.3% [Right] and 5.3% [Left] of those who had a visual acuity recorded, had V/A ≥ 6/36.

Weight /Height [BMI kg/m^2]:	Page 19 for more detail
Process:	96.2% of patients had a weight measurement and 86.5% of patients and had a height measurement, so BMI could be calculated for 86.2% of patients overall.
Outcome:	**≤25 kg/m^2** (18.7%); **25-27 kg/m^2** (10.6%); **>27 kg/m^2** (70.8%)

Blood Pressure:	Page 20 for more detail
Process:	Blood Pressure was recorded for 96.9% [n=4484] of individuals. BP plus Age were recorded for 95.9% [n=4437]. Whether or not on Antihypertensive therapy was recorded as 'Yes' for 67.9%, and of these, 52.2% were recorded as being on an ACE Inhibitor, 8.4% on an ACE Inhibitor+Thiazide, 34.2% on an A2 Antagonist, 19.9% on an A2 Antagonist+Thiazide, 39.0% on a Calcium Antagonist, 32.9% on a Beta Blocker, 8.5% on a Thiazide & 17.3% 'Other'.
Outcome:	**≤60 yrs** and **BP <140/90** (75.5%); **≤60 yrs** and **BP ≥140/90** (24.5%); **>60 yrs** and **BP <160/90** (87.2%)**; >60 yrs** and **BP ≥160/90** (12.8%); Overall NHMRC EB Guidelines Criteria ≤**130/80** (53.0%) & >**130/80** (47.0%).

Feet:	Page 21 for more detail
Process:	A total of 28.0% of patients were identified as having a "high risk foot" and a total of 34.9% were recorded as having seen a Podiatrist in the last 12 months.
Outcome:	2.1% of individuals had a current foot ulcer, an additional 2.5% an active foot lesion other than a current ulcer, and 5.5% a past history of a foot ulcer. In the last 12 months 0.7% had had a lower limb amputation. Peripheral Vascular Disease was recorded in 11.7% & Peripheral Neuropathy in 21.9%. Further analysis showed that 78/98 [79.6%] of those with current foot ulceration and 26/33 [78.8%] of those with a lower limb amputation in the past 12 months had had previous foot ulceration. 4.4% had a Foot Deformity reported.

Lipids:

Pages 22 & 27 for more detail

Process: 76.2% of patients had a Cholesterol level recorded, 62.3% had an LDL Cholesterol level 66.3% had an HDL Cholesterol level, and 75.3% a Triglyceride level. Whether these lipid levels were collected fasting was recorded in 52.6% of individuals. A total of 68.5% of cases [where any lipid level was recorded] were fasting specimens.

Outcome:

Cholesterol [n=3526]
<5.5 mmol/L 87.5% **5.5-6.5 mmol/L** 9.0% **>6.5 mmol/L** 3.5%
<5.0 mmol/L 77.7% **5.5-6.5 mmol/L** 18.8% **>6.5 mmol/L** 3.5%
Fasting Cholesterol [n=2416]
<5.5 mmol/L 87.8% **5.5-6.5 mmol/L** 8.6% **>6.5 mmol/L** 3.6%
<5.0 mmol/L 78.4% **5.5-6.5 mmol/L** 18.0% **>6.5 mmol/L** 3.6%

LDL Cholesterol [n=2946]
<2.5 mmol/L 65.9% **≥2.5 mmol/L** 34.0%
Fasting LDL Cholesterol [n=2090]
<2.5 mmol/L 65.5% **≥2.5 mmol/L** 34.5%

NB *Data in Table 15[b] (P 22) differ as they use Calculated LDL if not provided by sites*

HDL Cholesterol [n=3067]
<1.0 mmol/L 27.6% **≥1.0 mmol/L** 72.4%
Fasting HDL Cholesterol [n=2172]
<1.0 mmol/L 28.1% **≥1.0 mmol/L** 71.9%

Triglyceride [n=3487]
<2.0 mmol/L 69.5% **2.0-4.0 mmol/L** 25.2% **>4.0 mmol/L** 5.4%
Fasting Triglyceride [n=2394]
<2.0 mmol/L 70.2% **2.0-4.0 mmol/L** 24.4% **>4.0 mmol/L** 5.4%

Renal Function:

Table 16 Page 23 for more detail

Process: A microalbumin or urinary protein level was recorded for 65.1% of patients. Of these, 100% of patients had an assay upper limit of normal range [ULN] measurement recorded, and 85.0% of patients had the assay units stated. Thus in 55.3% of individuals overall, an assessment of the relationship of the urinary microalbumin or protein result to the ULN and respective assay units could be made.

These are the % WHERE THE TEST WAS DONE

Outcome:

Microalbumin	[n=2256]	Proteinuria	[n=81]
Normal	(60.8%);	**<150 mg/24hr**	(53.1%);
Microalbuminuria	(27.0%);	**150-300 mg/24hr**	(17.3%);
Macroalbuminuria	(12.3%)	**>300 mg/24hr**	(29.6%)

Pages 17-23 provide further detail on data reported in line with the NSW Clinical Management Guidelines for Diabetes[12] in terms of the 7 key management areas, (one page per Guideline topic).

Appendix 4 provides a copy of the 3 page Guideline Report that formed part of the Site Data Reports (see page 10), - this being the Report for All Data.

[Findings / Results thence continue on page 24].

2.4.1 BLOOD GLUCOSE CONTROL:

Recorded	Most recent/current Glycated Haemoglobin Result [HbA1c (%)] in the last 12 months, and Upper Limit of Normal Range [ULN] (%).
% Missing (Overall))	Glycated Haemoglobin Result 8.3% ; Upper Limit of Normal Range 0%.
	This meant that in 91.7% of records, a Glycated Haemoglobin result AND Range ULN were available for analysis.
Results	***[1] Mean ± SD :*** **Table 9** gives overall results for Glycated Haemoglobin for the Total Group. See Frequency Tables for n= and range data ***[2] Glycated Haemoglobin Result relative to ULN Range :*** **Table 10** gives overall results for Glycated Haemoglobin relative to ULN **Table 10[a]** gives Type 1 results for Glycated Haemoglobin mean *and* relative to ULN Range for that result. ***See Frequency Tables for n= and range data.***

Table 9 - Blood Glucose Control : Glycated Haemoglobin (Mean ± SD)

Glycated Hb	[All n] ⇓	All n = 4629	Adult n = 4629	Paediatric n = 0
Overall	4244		8.1 ± 1.7	
Type 1	993		8.5 ± 1.8	
Type 2	3114		8.0 ± 1.7	
GDM	21		5.3 ± 0.6	
Don't know	15		9.0 ± 2.4	
Other	53		7.8 ± 1.6	
Missing Diabetes Type	48		8.5 ± 1.8	

Table 10 - Blood Glucose Control : Glycated Haemoglobin (*% above ULN*)

Glycated Hb	[All n] ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
≤1% above ULN	1281		30.2%	
1-2% above ULN	1156		27.2%	
>2% above ULN	1807		42.6%	
Missing ULN or HbA1c	385		9.1%	

NOTE: Since there were NO missing HbA1c ULN results, the missing 385 represents records with no HbA1c level provided.

Table 10[a] - Type 1 Blood Glucose Control : Glycated Haemoglobin (*% above ULN*)

Glycated Hb (Type 1 Diabetes)	[All n] ⇓	All % n = 993	Adult % n = 993	Paediatric % n = 0
Mean HbA1c			8.5 ± 1.8	
≤1% above ULN	192		19.3%	
1-2% above ULN	265		26.7%	
>2% above ULN	536		54.0%	
Missing ULN or HbA1c	57		5.7%	

NOTE: More Type 1 individuals had an HbA1c >2% above ULN and less ≤1% above ULN than Adult Individuals overall.

Tables on Pages 93-100 of *Appendix 5* show the breakdown for Mean HbA1c by Diabetes Type for all data, thence Target HbA1c. The Graphs show the spread/comparison of site's results ranked in order for totals and broken down by Diabetes Type.
The pages are All Sites Data which in 2011 is all Adult Forms Data.

2.4.2 EYES:			
Recorded	Most recent/current Visual Acuity [Right & Left], whether Dilated [No/Yes], Retinal Assessment [Right & Left], and whether Referred [No/Yes], and/or Attended Ophthalmologist [No/Yes], and Attended Optometrist [No/Yes].		
% Missing (Overall))	Visual Acuity:	[Right] 51.4 %	[Left] 51.5 %
	Examined last 12 months:	38.4 %	
	Retinal Assessment	[Right] 34.8 %	[Left] 34.8 %
	Retinal Camera	57.8 %	
	Referred to Ophthalmologist	30.2 %	
	Attended Ophthalmologist	38.3 %	
	Attended Optometrist	33.4 %	
	This meant that a Visual Acuity was recorded just under half of the records, and Retinal Assessment also in almost 65.0% of records overall – *much better than in previous years*.		
Results	***[1] Visual Acuity and Retinal Status :***		

Table 11 gives overall results for Visual Acuity for the Total Group where a Visual Acuity was provided, broken down by arbitrary cut points of 6/9 and 6/36, and Retinal Status in regards to 'Diabetes Abnormality' [Yes]. ***See Frequency Tables for n= and range data.***

Table 11 - Visual Acuity [Arbitrary cut-points 6/9 and 6/36] & Retinal Status

Visual Acuity		[All n] ⇓	All % n = 2229	Adult % n = 2229	Paediatric % n = 0
≤ 6/9	[L]	1716		76.4%	
	[R]	1719		76.5%	
> 6/9 and < 6/36	[L]	413		18.4%	
	[R]	410		18.2%	
> 6/36	[L]	118		5.3%	
	[R]	119		5.3%	
Diabetes Abnormality	[L]	775		34.5%	
	[R]	772		34.3%	
New Blindness		40		1.8%	
		47		2.1%	

Tables on Pages 195-202 of *Appendix 5* show the breakdown for Visual Acuity and presence of Diabetes Abnormality by Diabetes Type for all data.
The pages are All Sites Data which in 2011 is all Adult Forms Data.

2.4.3 WEIGHT / HEIGHT : BMI	
Recorded	Most current Weight {Wt}[kgs] and Height {Ht}[m]. BMI was Calculated [Wt/Ht^2].
% Missing (Overall)	Weight 3.8% Height 13.5% BMI [Weight or Height] 13.8%;
	This meant that in 86.2% of records, a Weight result AND a Height result were available for calculation and analysis of BMI.
Results	***[1] Mean ± SD :***

Table 12 gives overall results for BMI for the Total Group and broken down by Diabetes Type. ***See Frequency Tables for n= and range data.***

Table 12 – BMI (Mean ± SD)

BMI	[All n] ⇓	All n = 4629	Adult n = 4629	Paediatric n = 0
Overall	3989		31.3 ± 7.5	
Type 1	875		26.6 ± 6.2	
Type 2	2945		32.8 ± 7.4	
GDM	70		31.9 ± 7.0	
Don't know	14		31.4 ± 6.5	
Other	54		28.5 ± 7.8	
Missing	31		30.7 ± 5.4	

Tables on Pages 103-106 of Tables *Appendix 5* show the breakdown for Mean BMI [plus Age and Diabetes Duration data] by Diabetes Type for all data, thence Target BMI data. The Graphs show the spread/comparison of site's results ranked in order for totals and broken down by Diabetes Type.
The pages are All Sites Data which in 2011 is all Adult Forms Data.

2.4.4 BLOOD PRESSURE :

Recorded	Most recent/current Blood Pressure [Systolic(SBP)/Diastolic(DBP)], 'On Anti-hypertensive Treatment?' {antiBP Rx}[No/Yes], 'On ACE Inhibitor?'[No/Yes], 'On Calcium Antag?'[No/Yes], 'On Beta Blocker?'[No/Yes], 'On A2 Antag?' [No/Yes].
% Missing (Overall)	SBP 3.1% DBP 3.1% ; On Anti-hypertensive treatment 16.2% [and 16.3% if conditional on age >18] ; On ACE 29.2% [16.9% if conditional on Anti-hypertensive treatment = Yes], On ACE+Thiazide 24.7% [18.6% if conditional on Anti-BP treatment = Yes], On A2 Antagonist 31.0% [18.7% if conditional on Anti-BP treatment = Yes], On A2 Antag+Thiazide 24.5% [17.9% conditional on Anti-BP Rx = Yes]. On Calcium Antag 31.8% [19.8% if conditional on Anti-BP treatment = Yes], On Beta Blocker 32.4% [20.4% if conditional on Anti-BP treatment = Yes], On Thiazide 43.7% [36.1% if conditional on Anti-BP treatment = Yes]. On 'Other' 37.0% [26.7% if conditional on Anti-BP treatment = Yes].
	This meant that in 82.0% of records, a Blood Pressure result AND Anti-Hypertensive Treatment status were available for combined analysis.
Results	***[1] % On Anti-hypertensive Treatment*** Overall [2637/4629] **57.0%** All Adult –For Age>18 [2600/4629] **57.4%** ***[2a] % On ACE Inhibitor [if On Anti-hypertensive Treatment = Yes]*** Overall [1144 / 2637] **52.2%** ***[2b] % On ACE Inhibitor + Thiazide [if On Anti-BP Treatment = Yes]*** Overall [181 / 2637] **8.4%** ***[2c] % On A2 Antagonist [if On Anti-hypertensive Treatment = Yes]*** Overall [734 / 2637] **34.2%** ***[2d] % On A2 Antagonist + Thiazide [if On Anti-BP Treatment = Yes]*** Overall [431 / 2637] **19.9%** ***[2e] % On Calcium Antagonist [if On Anti-hypertensive Treatment = Yes]*** Overall [825 / 2637] **39.0%** ***[2f] % On Beta Blocker [if On Anti-hypertensive Treatment = Yes]*** Overall [690 / 2637] **32.9%** ***[2f] % On Thiazide [if On Anti-hypertensive Treatment = Yes]*** Overall [143 / 2637] **8.5%** ***[2g] % On 'Other' [if On Anti-hypertensive Treatment = Yes]*** Overall [335 / 2637] **17.3%** ***[3] Mean ± SD :*** *[see Table 13]* There were 4484 BP levels recorded, with 3798 where 'on anti-hypertensive Rx' was recorded as Yes or No.

Table 13 gives overall results for Blood Pressure for the Total Group and broken down by 'On Anti-hypertensive Treatment' status (On antiBP Rx)[Yes, No, or antiBPRx Unstated (?)].

Table 13 – Blood Pressure (Mean ± SD)

Blood Pressure	[All n] ⇓	All n = 4629	Adult n = 4629	Paediatric n = 0
Overall	4484		130 ± 18 / 74 ± 10	
On AntiBP Rx: Yes	2594		134 ± 18 / 74 ± 11	
On AntiBP Rx: No	1204		122 ± 15 / 73 ± 10	
On AntiBP Rx: Missing	686		127 ± 17 / 73 ± 11	

Overall NHMRC EB Guidelines Criteria ≤**130/80** (53.0%) & >**130/80** (47.0%).

Tables on pp 101-102 of *Appendix 5* show the breakdown for Mean BP by Age (≤60, >60) for all data. The Graphs show the spread/comparison of site's results ranked in order for totals and broken down by Age. See pp 155-170 of *Appendix 5* for BP Tablet data.
The pages are All Sites Data which in 2011 is all Adult Forms Data.

2.4.5 FEET :	
Recorded	The presence of Peripheral Neuropathy [No/Yes], Peripheral Vascular Disease [No/Yes], Past History of Foot Ulceration [No/Yes], Current Foot Ulceration [No/Yes], Active Foot Lesion [No/Yes], Foot Deformity [No/Yes] and whether Attended Podiatrist [No/Yes]. Also recorded Lower Limb Amputation in the last 12 months [No/Yes] or previously [No/Yes]. These are **ADULT DATA**
% Missing (Overall)	Peripheral Neuropathy 4.4 % Peripheral Vascular Disease 4.8 % Past History of Foot Ulceration 18.2 % Current Foot Ulceration 18.4 % Active Foot Lesion 27.8 % Foot Deformity 27.6 % Attended Podiatrist 20.5 % Lower Limb Amputation in the last 12 months 16.3% Lower Limb Amputation Previously 18.1% **The high % missing here are contributed to by the large number of Electronic Site data records received, many of which did not contain data for these fields.** [*see Note [2] Discussion and Executive Summary*].
	As there few/nil of these conditions/events in Paediatric sites in 1998, these problems were not asked for Paediatric/Adolescent patients except for Peripheral Neuropathy. The percentages in brackets are the All Forms and the Paediatric/Adolescent Forms missing data, for the one of these fields collected on all individuals. All others are Adult Forms only data.
Results	***[1] Current Status (% Present) :*** *[see Table 14]*

Table 14 gives overall results for Current Data on Feet.

Table - 14 Feet- Current Status (% Present)

Feet	All n = ⇓	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
Past history of Foot Ulceration	256		5.5%	
Current Foot Ulceration	98		2.1%	
Active Foot Lesion	116		2.5%	
Foot Deformity	203		4.4%	
Peripheral Vascular Disease	540		11.7%	
Peripheral Neuropathy	1013		21.9%	
Amputation: in the last 12 months	33		0.7%	
Amputation: Previously	97		2.1%	
Amputation: New or Previously	119		2.6%	

There are NO Tables [*Appendix 5*] showing the breakdown for Foot Data by Diabetes Type for all data.

2.4.6 LIPIDS :

Recorded	Most recent/current Lipids [Cholesterol (Chol), LDL Cholesterol (LDL), HDL Cholesterol (HDL), Triglycerides (Trigs)], in the last 12 months, 'Fasting' [No/Yes], and 'On Anti-Lipid Therapy' [No/Yes].
% Missing (Overall)	Cholesterol 23.8% ; LDL Cholesterol 37.7% ; HDL 33.7% ; Triglycerides 24.7% ; Fasting 36.1% [20.9% conditional on any lipid result having been recorded]; On Anti-Lipid 11.9% [6.4% if conditional on any lipid result recorded].
	This meant that in 52.2% & 51.7% of records respectively, a Cholesterol &/or Triglyceride result AND Fasting status were available for Fasting Lipid analysis. [This was 46.9% of the records for HDL Cholesterol and 45.2% for LDL Cholesterol provided by sites].
Results	***[a] Mean ± SD :*** **Table 15[a]** gives overall results for Lipids for the Total Group and broken down by 'Fasting' status. There were 3526 Cholesterol levels (2416 Fasting), 2946 LDL Cholesterol levels (2090 Fasting), 3067 HDL Cholesterol levels (2172 Fasting) and 3487 Triglyceride levels (2394 Fasting) provided overall. ***See Frequency Tables for n= and range data.*** ***[b] LDL Cholesterol*** **Table 15[b]** shows calculated LDL Cholesterol levels by arbitrary cut points.

Table 15[a] – Lipids (Mean ± SD)*

Lipids	All n = 4629	Adult n = 4629	Paediatric n = 0
Cholesterol		4.3 ± 1.1	
Fasting Cholesterol		4.3 ± 1.1	
HDL Cholesterol		1.2 ± 0.4	
Fasting HDL Cholesterol		1.2 ± 0.4	
Triglyceride		1.8 ± 1.5	
Fasting Triglyceride		1.8 ± 1.6	
LDL Cholesterol		2.2 ± 0.9	
Fasting LDL Cholesterol		2.2 ± 0.9	

*** LDL is as Reported by sites**

Table 15[b] – Lipids - LDL Cholesterol**

Lipids	n = 3022	Adult Forms Only n = 4629		
< 2.5 mmol / L	1975		65.4%	
2.5 - 3.5 mmol / L	768		25.4%	
≥ 3.5 mmol / L	279		9.2%	
Fasting	2046		n = 2046	
< 2.5 mmol / L	1254		61.3%	
2.5 - 3.5 mmol / L	543		26.5%	
≥ 3.5 mmol / L	202		9.9%	

**** LDL is as Reported by sites or Calculated from available lipids if no LDL was provided**
[Calculated as: Total Fasting Cholesterol [if <15] - Trigs [if <4.5] / 2.2 – HDL]: [Adult Forms Only]

Tables on Pages 107-134 of *Appendix 5* show the breakdown of Mean Lipids (Total then Fasting) by Diabetes Type for all data, thence Target Lipids (Total then Fasting).The Graphs show the spread/comparison of site's results ranked in order for totals and by Diabetes Type. The pages are All Sites Data which in 2011 is all Adult Forms Data.

See also Page 27 [2.7.2 Lipid Therapy Status].

2.4.7 MICROALBUMIN / URINARY PROTEIN :

Recorded	Most recent/current Urinary Microalbumin or Protein estimation in the last 12 months, Urinary Microalbumin (or Protein) Upper Limit of Normal Range [ULN] and Units.
% Missing (Overall)	Urinary Microalbumin or Protein estimation 34.6% ; Upper Limit of Normal Range 100%, [100% if conditional on a Microalbumin (or Protein) result having been recorded] ; Units 44.2%, [15.0% if conditional on a Microalbumin (or Protein) result having been recorded].
	This meant that in 50.5% of records, a Microalbumin (or Protein) result AND Range ULN AND Units were available for combined analysis.
Results	[1] Microalbuminuria / Proteinuria : There were 2256 Microalbumin and 81 urinary protein results recorded overall. ***See Frequency Tables for n= and range data.***

Table 16 gives overall results for Microalbuminuria (or Proteinuria) for the Total Groups.

Table 16 – Microalbuminuria / Proteinuria [PRU]

Microalbuminuria	All % n = 4629	Adult % n = 4629	Paediatric % n = 0
Normal		60.8%	
Microalbuminuria		27.0%	
Macroalbuminuria		12.3%	
Urinary Protein:			
<150 mg/24hr		53.1%	
150-300 mg/24hr		17.3%	
>300 mg/24hr		29.6%	

NB The urinary albumin/protein results in Table 16 represent <u>the percent of those where the test/procedure was done</u> [eg 27.0% *of those with a microalbumin result* had microalbuminuria, NOT 27.0% of ALL patients].

Tables on Pages 135-138 of *Appendix 5* show the breakdown for Microalbuminuria and Proteinuria by Diabetes Type for all data. The Graphs show the spread/comparison of site's results ranked in order for totals and broken down by Diabetes Type.
The pages are All Sites Data which in 2011 is all Adult Forms Data.

See also Pages 29-30 [2.7.4 Serum Creatinine Data].

2.5 Missing Data:

With regard to Missing Data, **Table 23[b],** [pages 36-38], detail Missing Data [Adult Forms], listing in increasing frequency, the missing data items.

Whilst some data items were almost 100% collected, overall Missing Data ranged from [n=24] **0.5%** [Sex of Individual] to [n=2674] **57.8%** [Retinal Camera], thence [n=2382] 51.5 % [Visual Acuity-Left] and [n=2381] 51.4% [Visual Acuity-Right]. There were **13.9% of the data items less than 20% missing** {[0-5] 5.2% / [5-10] 3.5% / [10-15] 2.6% / [15-20] 2.6%]}, 27.8% were missing from 20-40% of records and 58.3% were missing from >40% of records [**Table 24**].

Overall, the 'least' collected/recorded data items were again [as in previous years] Visual Assessment fields.

Table 24 - Final Missing Data Overall

Missing data	0 and <=5%	>5 and <=10%	>10 and <=15%	>15 and <=20 %	>20 and <= 40%	>40%
	5.2%	3.5%	2.6%	2.6%	27.8%	58.3%

Sites were given an opportunity to supply any missing data and to validate questionable data. **Table 24[a]** shows the Missing 'Vital' Data items obtained by requesting their provision from sites – with reasonable improvements [except Weight (only 13.4% obtained), and Height (only 15.4% obtained)]. As can be seen from the Table below, this process reduced the missing data in six of the nine elements sought, by a half - to over 85% {56.5-86.5%}.

Table 24[a] - Missing Data Obtained from Sites

Data Item	Initially Missing n =	Initially Missing [%]	Still Missing n =	Still Missing [%]	Obtained [%]
Date of Birth	139	3.0%	49	1.1%	64.7%
Sex	177	3.8%	24	0.5%	86.4%
Height	738	15.8%	624	13.5%	15.4%
Weight	201	4.3%	174	3.8%	13.4%
Initial Visit	146	3.1%	29	0.6%	80.1%
Diagnosis Year	221	4.7%	148	3.2%	33.0%
Diabetes Type	230	4.9%	60	1.3%	73.9%
Diabetes Therapy	69	1.5%	30	0.6%	56.5%
Insulin Since	1827	39.1%	246	5.3%	86.5%

Note that we have contributed to this in some ways, by application of the Validation Rules [1.6 Page 9 above] …

- *increasing* missing data in some fields, by removing incorrect / impossible results; and
- *decreasing* missing data in some fields by other data manipulations [eg the eGFR and eGFRresult fields - where in cases when an eGFR result was provided, but the eGFR Yes/No field was empty – we have changed this to Yes or No appropriately].

2.6 Questionnaire Results:

Table 17 details the results of assessment of the Lickert Scale responses from participants to the specific questions related to the data collection project [***Appendix 2***]. Details remain similar to data in previous years [which appear in *Appendix 7*].

- Questionnaire 1 relates to the data collection process;
- A second Questionnaire relates to comments on the Individual Site and Doctor Reports. [This was sent in 2011 but responses not collated at the time of preparation of this report].

Free text responses to questions and to other items will be reviewed individually, and utilised to refine the data collection instrument and reporting process, and will thus assist in running future data collections and providing appropriate feedback to participants.

Table 17 - Questionnaire 1 Responses

Questionnaire 1 [Re Data Collection Process] - Lickert Scale {1[Poor]-5[Good]} 3=Midpoint [n = 18]	Mean ± (SD)
Information Package/Letters	3.9 ± 1.0
Data Definitions Form	3.9 ± 1.1
Format (layout of data items)	3.5 ± 1.1
Ease of completion	3.1 ± 1.3
Time to complete the Form	2.6 ± 1.5

The results in Table 17, from 18 respondents, show that there was general approval of the 'Process' including the information provided, data definitions form and overall format. These findings are similar to previous ANDIAB collections, and encouraging given that some of the participating sites in 2011 were 'new' or had not participated for some time. Clearly, [also as in previous years], the ease and particularly time to complete the ANDIAB audit form are of concern to participants. As discussed elsewhere, provision of data from existing databases obviates these issues – but creates issues/difficulties of its own - ***See***:

- Executive Summary Notes [1] and [2] [pages C], re Missing and Grouped data;
- Note under Table 7b[1] [page 14], re Yes/No data;

and

- Discussion - Missing Data, pages 41-42.

2.7 Additional Analyses:

Tables 18 [a] and [b] [over] provide a breakdown [by Diabetes Type respectively] of Age by Duration of Diabetes (where all three data items were available for analysis).

This shows the majority of individuals who were stated to be Type 1 were in the 20-29 decade age range, [23.7%], with 19.8% [of all Type 1 individuals], in the 30-39 age group.

For Type 2, the predominant age decades of individuals were 60-69 [33.0%], thence 70-79 and 50-59 [24.9% & 21.2% respectively].

Table 18[a] - Age by Duration of Diabetes (Type 1 DM)

Age Group		Duration of Diabetes					
		≤ 18 Mths	18Mth-5 Yrs	6-10 Yrs	11-15 Yrs	≥ 16 Yrs	Total
< 10	n	1	3	3	0	0	7
	%	14.3%	42.9%	42.9%	0.0%	0.0%	0.8%
10 - 19	n	11	23	26	14	1	75
	%	14.7%	30.7%	34.7%	18.7%	1.3%	8.5%
20 - 29	n	23	32	50	54	50	209
	%	11.0%	15.3%	23.9%	25.8%	23.9%	23.7%
30 - 39	n	11	36	23	24	81	175
	%	6.3%	20.6%	13.1%	13.7%	46.3%	19.8%
40 - 49	n	6	8	19	22	99	154
	%	3.9%	5.2%	12.3%	14.3%	64.3%	17.4%
50 - 59	n	1	6	12	12	104	135
	%	0.7%	4.4%	8.9%	8.9%	77.0%	15.3%
60 - 69	n	7	7	5	9	49	77
	%	9.1%	9.1%	6.5%	11.7%	63.6%	8.7%
70 - 79	n	1	4	2	2	27	36
	%	2.8%	11.1%	5.6%	5.6%	75.0%	4.1%
80 +	n	1	0	0	0	14	15
	%	6.7%	0.0%	0.0%	0.0%	93.3%	1.7%
Total	**n**	**62**	**119**	**140**	**137**	**425**	**883**
	%	**7.0%**	**13.5%**	**15.9%**	**15.5%**	**48.1%**	**100.0%**

Table 18[b] - Age by Duration of Diabetes (Type 2 DM)

Age Group		Duration of Diabetes					
		≤ 18 Mths	18 Mths-5 Yrs	6-10 Yrs	11-15 Yrs	≥ 16 Yrs	Total
< 10	n	0	0	0	0	0	0
	%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10 - 19	n	2	2	0			4
	%	50.0%	50.0%	0.0%	0.0%	0.0%	0.1%
20 - 29	n	7	11	6	2	0	26
	%	26.9%	42.3%	23.1%	7.7%	0.0%	0.9%
30 - 39	n	21	29	22	5	3	80
	%	26.3%	36.3%	27.5%	6.3%	3.8%	2.7%
40 - 49	n	42	81	74	44	30	271
	%	15.5%	29.9%	27.3%	16.2%	11.1%	9.2%
50 - 59	n	73	130	159	133	133	628
	%	11.6%	20.7%	25.3%	21.2%	21.2%	21.2%
60 - 69	n	70	125	206	223	353	977
	%	7.2%	12.8%	21.1%	22.8%	36.1%	33.0%
70 - 79	n	36	47	119	175	359	736
	%	4.9%	6.4%	16.2%	23.8%	48.8%	24.9%
80 +	n	19	17	30	43	126	235
	%	8.1%	7.2%	12.8%	18.3%	53.6%	7.9%
Total	**n**	**270**	**442**	**616**	**625**	**1004**	**2957**
	%	**9.1%**	**14.9%**	**20.8%**	**21.1%**	**34.0%**	**100.0%**

*NB: **Duration of diabetes** was calculated as: [2011 minus stated 'Year of Diagnosis']. The resulting integer would be 0 if diagnosed in 2011, and 1 if diagnosed in 2010 [and in fact a maximum of 18 Mths – 1 Jan '10 diagnosis to 30 Jun '11 survey]. Duration 18 Mths-5 Years is thus a minimum 18 Mths {Dec '09 diagnosis to Jun '11 survey} to 5 years 06-11].*

In regards to duration of Type 1, 7.0% were "newly diagnosed" (duration <=18 Months), with 13.5% 18 Months-5 Years duration, and 15.9% 6-10 Years - the remainder being 15.5% 11-15 Years and 48.1% 16-plus Years. For Type 2 there were 9.1% "newly diagnosed", the remainder relatively equally spread across the diabetes duration groups, apart from the largest group, 34.0% having a diabetes duration of 16 plus Years.

2.7.1 Age-Sex Data :

Table 19[b] provides the Age-Sex breakdown of the data for All sites, Adult Forms and Paediatric Forms respectively.

Table 19[b] – Age-Sex Data – Adult Forms Only

Age Data			Sex Data		
Age Group	Total	%	Male	Female	Missing
Missing	49	1.1%	24	20	5
0-9	7	0.2%	5	2	0
10-14	17	0.4%	11	6	0
15-19	119	2.6%	60	58	1
20-24	152	3.3%	71	81	
25-29	169	3.7%	64	105	0
30-34	172	3.7%	69	100	3
35-39	184	4.0%	91	93	
40-44	228	4.9%	110	118	
45-49	275	5.9%	156	118	1
50-54	417	9.0%	209	203	5
55-59	490	10.6%	290	200	
60-64	622	13.4%	360	259	3
65-69	600	13.0%	364	235	1
70-74	505	10.9%	276	229	
75-79	357	7.7%	183	172	2
80-84	196	4.2%	103	92	1
85+	70	1.5%	30	38	2
Total	**4629**	**100.0%**	**2476**	**2129**	**24**

From the 2011data, the largest age groups overall were 60-64 [13.4%] and 65-69 [13.0%].

2.7.2 Lipid Therapy Status:

Table 20 provides a breakdown of the fasting Lipids data in regards to Lipid Therapy Status [as does Table 13 [page 20] for Blood Pressure and anti-hypertensive therapy]. Overall 60.0% of Adult Form individuals were stated to be on anti-Lipid Therapy. There is a difference for Total and LDL Cholesterol & for Triglycerides (*LOWER* in those NOT stated to be on Rx), [but minimal difference for HDL Cholesterol] between those where Lipid Therapy [Rx] is Yes versus No, compared to all data. See Frequency Tables for n= & range data.
See Tables on Pages 171-184 of *Appendix 5* for Individual Anti-Lipid Therapy Data.

Table 20 – Fasting Lipids and Lipid Therapy Status (Mean ± SD)

Fasting Lipids	All Sites n = 4629	Adult Forms n = 4629	Paediatric Forms n = 0
Fasting Cholesterol		4.3 ± 1.1	
Fasting Cholesterol - Lipid Rx = Yes		4.1 ± 1.1	
Fasting Cholesterol - Lipid Rx = No		4.7 ± 1.1	
Fasting HDL Cholesterol		1.2 ± 0.4	
Fasting HDL Cholesterol - Lipid Rx = Yes		1.2 ± 0.4	
Fasting HDL Cholesterol - Lipid Rx = No		1.3 ± 0.4	
Fasting Triglyceride		1.8 ± 1.6	
Fasting Triglyceride - Lipid Rx = Yes		1.9 ± 1.5	
Fasting Triglyceride - Lipid Rx = No		1.6 ± 1.9	
Fasting LDL Cholesterol		2.2 ± 0.9	
Fasting LDL Cholesterol - Lipid Rx = Yes		2.1 ± 0.8	
Fasting LDL Cholesterol - Lipid Rx = No		2.7 ± 0.9	

2.7.3 Complications / Events [in the last 12 months]:

Tables 21[a] and 21[b] show the percent of observed complications by stated duration of diabetes for patients with Type 1 and Type 2 diabetes respectively. The last column calculates the percent of Type 1 and Type 2 individuals respectively, who were found to have each complication. As expected, the occurrence of complications increases with duration, in Type 2 [and particularly in Type 1 for 16+ years], but not so for Proteinuria in Type 1 [note small numbers however – n=3]. Also, most [but not all] of these complications were reported in significant percentages in Type 2 individuals at, or soon after, diagnosis [ie diabetes duration <=18 Mths].

[*Please see comments on Diabetes Duration calculation page 26 and page 43*].

Table 21[a] - % Complications and Events in the last 12 months by Duration and Type of Diabetes* - Type 1

Complications of Type 1	Duration of Diabetes						
	< 18 Mths	18 Mths - 5 Years	6-10 Years	11-15 Years	> 16 Years	Total	% of Type 1
Perihperal Neuropathy #	1.7%	2.5%	5.0%	10.1%	80.7%	119	11.3%
Peripheral Vascular Disease	1.9%	5.8%	1.9%	3.8%	86.5%	52	5.0%
Current Foot Ulcer	0.0%	0.0%	0.0%	0.0%	100.0%	10	1.0%
Past History of Ulceration	0.0%	3.4%	0.0%	10.3%	86.2%	29	2.8%
Lower Limb Amputation - New	0.0%	0.0%	16.7%	0.0%	83.3%	6	0.6%
End Stage Renal Disease - New	0.0%	0.0%	0.0%	0.0%	100.0%	7	0.7%
New Blindness	0.0%	0.0%	0.0%	25.0%	75.0%	12	1.1%
Diabetes Abnormality - Either Fundus #	0.9%	0.9%	3.8%	10.9%	83.4%	211	20.1%
Microalbuminuria #	4.8%	15.2%	16.2%	16.2%	47.6%	105	10.0%
Macroalbuminuria #	0.0%	10.7%	3.6%	7.1%	78.6%	28	2.7%
Proteinuria #	33.3%	0.0%	0.0%	66.7%	0.0%	3	0.3%

*: % of each complication present in each duration group (raw total to 100%), # [All patients].

Table 21[b] - % Complications and Events in the last 12 months by Duration and Type of Diabetes* - Type 2

Complications of Type 2	Duration of Diabetes						
	≤ 18 Mths	18 Mths - 5 Years	6-10 Years	11-15 Years	≥ 16 Years	Total	% of Type 2
Perihperal Neuropathy #	3.6%	8.5%	14.5%	22.2%	51.3%	837	24.9%
Peripheral Vascular Disease	4.8%	6.5%	14.8%	22.3%	51.6%	461	13.7%
Current Foot Ulcer	2.4%	4.8%	25.3%	31.3%	36.1%	83	2.5%
Past History of Ulceration	3.8%	6.6%	16.0%	25.9%	47.6%	212	6.3%
Lower Limb Amputation - New	4.0%	4.0%	24.0%	28.0%	40.0%	25	0.7%
End Stage Renal Disease - New	0.0%	4.2%	12.6%	20.0%	63.2%	95	2.8%
New Blindness	3.7%	0.0%	11.1%	22.2%	63.0%	27	0.8%
Diabetes Abnormality - Either Fundus #	1.7%	4.1%	10.6%	19.3%	64.4%	587	17.5%
Microalbuminuria #	6.9%	15.5%	22.0%	19.9%	35.6%	637	19.0%
Macroalbuminuria #	3.4%	9.3%	19.5%	28.0%	39.8%	236	7.0%
Proteinuria #	11.5%	11.5%	7.7%	30.8%	38.5%	26	0.8%

*: % of each complication present in each duration group (raw total to 100%), # [All patients].

2.7.4 Serum Creatinine and Glomerular Filtration Rate [GFR] Data:

Table 22 [over] provides data on Serum Creatinine for individuals, as the percent of individuals in the (arbitrary) categories of: [below 120], [120-500] or [over 500] micromols per litre. See Frequency Tables for n= and range data.

Table 22 – Percent (%) Serum Creatinine

Serum Creatinine	[All n] ⇓	All Sites n = 3767	Adult Forms Only n = 3767	Paediatric Forms Only n = 0
< 120 µmol / L	3204		85.1%	
120 - 500 µmol / L	527		14.0%	
> 500 µmol / L	36		1.0%	

See Tables on Pages 139-140 of *Appendix 5* for Serum Creatinine Data. The Graphs show the spread/comparison of site's results ranked in order for totals and broken down by Age. The pages are All sites data[A], which in 2011 is equivalent to Adult Forms data .

From 2002 onwards, we have undertaken Glomerular Filtration Rate [GFR] calculations. Rather than using the Cockcroft-Gault equation [which tends to over estimate low and under estimate hyper filtration], we have used the MDRD [Modified Diet in Renal Disease] Study[15], 4 - variable formula [see below #] - (Serum Creatinine; Age; Height and Weight – with loading for female & ATSI). We have calculated GFR for all with appropriate data aged ≥20. The results are shown in **Tables 25** – **[a]** All patients **[b]** Type 1 and **[c]** Type 2.

The data have been converted to Low, Normal and High GFR based on sex and decade-specific age ranges as reported in the MDRD Study paper[15] [*which are based on their findings in non-diabetic individuals*]. These compensate for the approximate 10 ml/min/1.73 sq.m GFR decline per decade over 40 years.

Prior to 2011 we had NOT requested participants to provide an eGFR [estimated GFR] result on their patients – an oversight [in retrospect] given that this is now a standard calculation undertaken and reported by ALL Laboratories across Australia. It was collected in 2011.

Table 25[d] provides data on the degree / severity of reduced eGFR [with retrospective calculations for 2004, 2006 and 2009 data – {not previously undertaken} – for comparison].

In addition in **Table 25[d]**, for 2011 data only – where data are available, we have assessed the individuals stated to be on Metformin Therapy who have a calculated / estimated GFR of <=30, being n=16. This represents 0.6% of those patients stated to be on Metformin therapy.

Table 25[a] – GFR # (ml/min/1.73 sq.m) [All Patients]

Sex	Age	N	Low	Low %	Normal	Normal %	High	High %
Male	20-29	138	61	44.2%	66	47.8%	1	0.7%
	30-39	160	46	28.8%	96	60.0%	2	1.3%
	40-49	263	93	35.4%	139	52.9%	2	0.8%
	50-59	487	137	28.1%	302	62.0%	4	0.8%
	60-69	716	233	32.5%	403	56.3%	14	2.0%
	70-79	477	141	29.6%	262	54.9%	21	4.4%
	80+	147	46	31.3%	72	49.0%	16	10.9%
	Total	**2388**	**757**	**31.7%**	**1340**	**56.1%**	**60**	**2.5%**
Female	20-29	185	73	39.5%	93	50.3%	6	3.2%
	30-39	193	71	36.8%	87	45.1%	14	7.3%
	40-49	231	57	24.7%	139	60.2%	14	6.1%
	50-59	393	99	25.2%	236	60.1%	22	5.6%
	60-69	501	145	28.9%	264	52.7%	41	8.2%
	70-79	408	112	27.5%	203	49.8%	56	13.7%
	80+	140	33	23.6%	72	51.4%	22	15.7%
	Total	**2051**	**590**	**28.8%**	**1094**	**53.3%**	**175**	**8.5%**
Total		**4439**	**1347**	**30.3%**	**2434**	**54.8%**	**235**	**5.3%**

 # GFR (mL/min/1.73sq.m) = GFR x 1.73 / SA

GFR (mL/min) = 186.3 x Serum Creatinine^-1.154 x Age^-0.203 x 1.212 (if ATSI) x 0.742 (if female)

```
SA = 0.007184 x height^0.725 x weight^0.425
```

Table 25[b] – GFR # (ml/min/1.73 sq.m) [Type 1]

Sex	Age	N	Low	Low %	Normal	Normal %	High	High %
Male	20-29	126	57	45.2%	59	46.8%	1	0.8%
	30-39	100	25	25.0%	62	62.0%	1	1.0%
	40-49	76	21	27.6%	48	63.2%	0	0.0%
	50-59	92	25	27.2%	53	57.6%	1	1.1%
	60-69	39	10	25.6%	25	64.1%	1	2.6%
	70-79	26	6	23.1%	18	69.2%	2	7.7%
	80+	8	0	0.0%	7	87.5%	1	12.5%
	Total	**467**	**144**	**30.8%**	**272**	**58.2%**	**7**	**1.5%**
Female	20-29	133	47	35.3%	75	56.4%	2	1.5%
	30-39	94	26	27.7%	53	56.4%	2	2.1%
	40-49	92	22	23.9%	53	57.6%	7	7.6%
	50-59	65	17	26.2%	34	52.3%	3	4.6%
	60-69	45	14	31.1%	22	48.9%	5	11.1%
	70-79	14	3	21.4%	6	42.9%	3	21.4%
	80+	8	3	37.5%	3	37.5%		0.0%
	Total	**451**	**132**	**29.3%**	**246**	**54.5%**	**22**	**4.9%**
Total		**918**	**276**	**30.1%**	**518**	**56.4%**	**29**	**3.2%**

Table 25[c] – GFR # (ml/min/1.73 sq.m) [Type 2]

Sex	Age	N	Low	Low %	Normal	Normal %	High	High %
Male	20-29	11	4	36.4%	6	54.5%	0	0.0%
	30-39	53	17	32.1%	31	58.5%	1	1.9%
	40-49	177	70	39.5%	85	48.0%	2	1.1%
	50-59	378	105	27.8%	239	63.2%	3	0.8%
	60-69	652	215	33.0%	367	56.3%	13	2.0%
	70-79	442	134	30.3%	238	53.8%	19	4.3%
	80+	137	46	33.6%	64	46.7%	15	10.9%
	Total	**1850**	**591**	**31.9%**	**1030**	**55.7%**	**53**	**2.9%**
Female	20-29	20	6	30.0%	12	60.0%	0	0.0%
	30-39	40	14	35.0%	17	42.5%	4	10.0%
	40-49	123	28	22.8%	81	65.9%	5	4.1%
	50-59	316	79	25.0%	194	61.4%	19	6.0%
	60-69	444	128	28.8%	236	53.2%	36	8.1%
	70-79	385	105	27.3%	193	50.1%	52	13.5%
	80+	131	30	22.9%	69	52.7%	21	16.0%
	Total	**1459**	**390**	**26.7%**	**802**	**55.0%**	**137**	**9.4%**
Total		**3309**	**981**	**29.6%**	**1832**	**55.4%**	**190**	**5.7%**

Table 25[d] – GFR # (ml/min/1.73 sq.m)

GFR	2004		2006		2009		2011	
	n	%	n	%	n	%	n	%
>60	1344	44.7%	851	53.4%	2381	40.7%	2238	50.4%
>45 and ?60	345	11.5%	235	14.8%	487	8.3%	495	11.2%
>30 and ?45	169	5.6%	139	8.7%	292	5.0%	324	7.3%
≤30	101	3.4%	80	5.0%	162	2.8%	181	4.1%
Missing	1049	34.9%	288	18.1%	2525	43.2%	1201	27.1%
<30 and Meformin = Yes	Not Collected		Not Collected		32	1.1%	16	0.6%
Total	**3008**		**1593**		**5847**		**4439**	

 # GFR (mL/min/1.73sq.m) = GFR x 1.73 / SA
GFR (mL/min) = 186.3 x Serum Creatinine^-1.154 x Age^-0.203 x 1.212 (if ATSI) x 0.742 (if female)
SA = 0.007184 x height^0.725 x weight^0.425

In 2011, having collected eGFR for the first time, we undertook the same analyses as shown in Table 25[d], and the results appear on the next page as **Table 25[e].**

Table 25[e] – eGFR

eGFR	2011 n	2011 %
>60	2781	60.5%
>45 and ≤60	489	10.6%
>30 and ≤45	289	6.3%
≤30	207	4.5%
Missing	832	18.1%
≤30 and Meformin = Yes	16	0.7%
Total	**4598**	

These analyses shows more available eGFR results, with more individuals reportedly normal (>60) than in the MDRD calculations in Table 25[d] (60.5% versus 50.4%). The other results are similar with 4.5% having an eGFR ≤30 (versus 4.1% in Table 25[d]).

2.7.5 Paediatric/Adolescent Fields Data: {NIL IN 2011}

By way of comparison with previous years – please note that there were NO Paediatric/Adolescent FORMS distributed in 2006 or 2011.

2.7.6 Other Data Analyses:

Appendix 6 provides data [by diabetes type] for Age, BMI & Diabetes Duration, which have not otherwise been referred to [apart from the BMI component of the Age, BMI & Diabetes Duration graphs {Table 12 page 19 above & pages 103-106 ***Appendix 5***}]. Also presented are the data for Gender, Initial Visit, Indigenous Status and Currently Pregnant, as well as Smoking status and finally, Type of Diabetes by Treatment.

These data [most of which are very similar to those found in 2004, 2006 and 2009] show:

A slight preponderance of males with Type 1 [51.0%] & males with Type 2 [55.6%] overall.

Sex	Type 1	Type 2
Male %	51.0%	55.6%

Mean Age 39.3 ± 17 years Type 1, 63.5 ± 12.4 years Type 2, 32.8 ± 8.7 years GDM overall.

Age	Type 1	Type 2	GDM
Mean ± SD	39.3 ± 17	63.5 ± 12.4	32.8 ± 8.7

Mean BMI 26.6 ± 6.2 kg/m^2 Type 1 and 32.8 ± 7.4 kg/m^2 Type 2 overall.

BMI	Type 1	Type 2	GDM
Mean ± SD	26.6 ± 6.2	32.8 ± 7.4	31.9 ± 7

Mean Diabetes Duration 17.8 ± 13.4 years Type 1 and 13.1 ± 9.1 years Type 2 overall.

Duration	Type 1	Type 2	GDM
Mean ± SD	17.8 ± 13.4	13.1 ± 9.1	0.4 ± 1.1

Treatments for Type 2 data are, in general, similar to 2004 2006 and 2009 [data shown for comparison] with (versus 2009) less on Diet alone, less on Tablets and more on Insulin or Insulin plus Tablets [NB *Percentages calculated on those where a Therapy type was stated*]:

Treatment for Type 2	2004	2006	2009	2011
Diet Only	8.1%	5.7%	6.8%	5.0%
Tablets	47.2%	49.0%	40.1%	37.4%
Insulin	15.8%	13.7%	18.2%	18.5%
Insulin &Tabs	27.8%	31.4%	34.9%	39.1%
'Nil'	1.0%	0.2%	0.0%	0.0%

A breakdown of oral therapies reported follows – Patients are often on more than one Tablet [but only 5.9% reported to be on triple therapy in 2011] - see below.

Tablet Treatment for Type 2	%
Metformin	90.6%
Sulphonylurea	43.4%
Glitazone	5.8%
GLP1 Agonist	3.0%
DPP4 Inhibitor	7.6%
Acarbose	1.5%
Missing	4.4%

Number of Tablets		1 Tablet	2 Tablets	3 Tablets	4 Tablets	5 Tablets
Diabetes Tablets	2011	56.6%	37.2%	5.9%	0.3%	0.0%
Diabetes Tablets	2009	54.0%	39.3%	6.5%	0.2%	0.0%

Those on 4 Tablets (n=8 from 5 different Sites) were recorded as being on Triple Therapy [Metformin, Sulphonylurea and a Glitazone] – plus Acarbose (3), [Metformin, Sulphonylurea and a DDP4Inhibitor] – plus Acarbose (2), [Metformin, Sulphonylurea and a GLP1Agonist] – plus Acarbose (1), [Metformin, Sulphonylurea and a Glitazone] – plus a DDP4 Inhibitor (1), [Metformin, Sulphonylurea and a Glitazone] – plus a GLP1Agonist (1).

Also shown are data for the number of agents used for Blood Pressure and Lipid Therapy in 2011, with 2009 and 2006 data for comparison, the findings being similar *except* for more on 2 as opposed to only 1 Anti-Lipid Tablet in 2011.

Number of Tablets		1 Tablet	2 Tablets	3 Tablets	4 Tablets	5 Tablets
Anti - Hypertensive	2011	47.2%	31.6%	14.8%	5.0%	1.1%
	2009	44.5%	33.7%	15.6%	4.7%	1.4%
	2006	46.5%	33.5%	14.3%	5.1%	0.6%

Number of Tablets		1 Tablet	2 Tablets	3 Tablets	4 Tablets	5 Tablets
Anti - Lipid	2011	83.4%	15.3%	1.3%	0.0%	0.0%
	2009	89.5%	9.5%	0.8%	0.1%	0.0%
	2006	92.5%	6.6%	0.6%	0.2%	0.1%

[Also see Tables on pp 189-194 *Appendix 5 and* pp 219-220 *Appendix 6*].

ASPIRIN / CLOPIDOGREL

Amongst **Adults** where data were provided, results were similar to those provided in 2006 and 2009 with 44.0% reported to be on Aspirin [51.5% No; 4.5% Contraindicated], and 8.2% reported to be on Clopidogrel [89.2% No; 2.6% Contraindicated], & 4.2% reportedly on both.

Aspirin	n = 3631	Yes	No	Contraindicated	Both
2011		44.0%	51.5%	4.5%	4.2%
2009		50.9%	43.2%	5.9%	4.0%
2006		42.9%	47.1%	10.0%	2.8%
Clopidogrel	n = 3818	Yes	No	Contraindicated	Both
2011		8.2%	89.2%	2.6%	4.2%
2009		7.7%	87.8%	4.6%	4.0%
2006		8.7%	83.7%	7.6%	2.8%

[Also see Tables on pp 185-188 *Appendix 5*]

ADDITIONALLY, we have again undertaken some additional assessments (*based on recommendations received in feedback from an Endocrinologist following ANDIAB 2002).*

Tables on Pages 141-154 of *Appendix 5* show the breakdown of the number of complications at any time ** [Adult Forms only] by Diabetes Type – thence further assessed by Current Smoker = Yes [n=457] versus Current Smoker = No [n=2920] for macrovascular complications only. **Note:** this includes data from 7 Electronic Sites who use this 'old' Field format, plus a conversion of the new Smoking Field data from other sites, to this format.

[Also see Tables on Pages 217-218 *Appendix 6* re Smoking Status].

***Possible complications are: Cerebral Stroke, CABG / Angioplasty, Myocardial Infarction, End Stage Renal Disease, Lower Limb Amputation and Blindness. Each of these complications can be new or previous. Occurrence of a complication, both in the past 12 months and previously, is counted once only. Peripheral Neuropathy and Peripheral Vascular Disease are counted as separate current complications.*

COMPLICATIONS

[a] Overall Complications

In 2004 these data showed that overall 49.7% had no complications reported, 40.5% had 1-2 complications and 9.8% had 3+ complications. Removing PN & PVD [not collected in 2006], and recalculating the 2004 data showed 74.0% had no complications reported, 24.3% had 1-2 complications and 1.6% had 3+ complications.

The respective data for 2006 were similar:

74.1% [no complications] 23.9% [1-2 complications] and 2.0% [3+ complications]

The respective data for 2009 (showing more with complications) were:

66.3% [no complications] 27.3% [1-2 complications] and 6.4% [3+ complications]

The 2011 data [including PN & PVD] show that overall 61.7% had no complications reported, 30.0% had 1-2 complications and 8.3% had 3+ complications.

Complications	Nil	1 - 2	3+
	61.7%	30.0%	8.3%

The respective data for 2009 recalculated after removing PN & PVD ***showed more with NO complications in 2009 compared to the previous two ANDIAB collections***:

81.5% [no complications] 17.3% [1-2 complications] and 1.2% [3+ complications]

The 2011 data recalculated after removing PN & PVD ***were similar*** to 2009, with 78.2% having no complications reported, 20.5% had 1-2 complications and 1.3% 3+ complications.

Complications (no PVD or PN)	Nil	1 - 2	3+
	78.2%	20.5%	1.3%

Whether this represents a true reduction in the occurrence of complications or reflects a reduction in reporting of complications in the last 2 ADNAIB collections is impossible to say.

[b] Vascular Complications & Smoking Status

In 2004 with regard to Current Smokers versus Current Non-smokers, interestingly the respective percentages were similar, where 68.0% versus 66.3% had no complications reported, 27.4% versus 28.6% had 1-2 complications and 4.6% versus 5.1% had 3+ complications [**Table 26**] (over).

Table 26 Vascular Complications and Smoking [Adult Forms Only]

Vasular Complications / Smoking Status	No Vasc Complications	1-2 Vasc Complications	3+ Vasc Complications
2000 Current	0.0%	0.0%	0.0%
2000 Non Smoker	0.0%	0.0%	0.0%
2000 Missing Smoking Status	70.1%	26.6%	3.2%
2002 Current	79.3%	18.9%	1.8%
2002 Non Smoker	65.8%	30.3%	3.9%
2002 Missing Smoking Status	57.5%	35.6%	6.9%
2004 Current	68.0%	27.4%	4.6%
2004 Non Smoker	66.3%	28.6%	5.1%
2004 Missing Smoking Status	62.1%	32.7%	5.2%
2006 Current	76.9%	23.1%	0.0%
2006 Past	65.4%	32.8%	1.8%
2006 Never	82.4%	16.1%	1.5%
2006 Current + Past	68.3%	30.3%	1.4%
2006 Past and Never	76.0%	22.4%	1.7%
2006 Missing Smoking Status	75.6%	23.2%	1.2%
2009 Current	64.5%	32.2%	3.3%
2009 Past	42.4%	49.0%	8.6%
2009 Never	73.7%	23.4%	2.9%
2009 Current + Past	48.2%	44.7%	7.2%
2009 Past and Never	60.4%	34.3%	5.3%
2009 Missing Smoking Status	51.4%	44.0%	4.6%
2011 Current	64.9%	30.9%	4.1%
2011 Past	52.4%	41.1%	6.6%
2011 Never	77.5%	19.5%	3.1%
2011 Current + Past	55.7%	38.4%	5.9%
2011 Past and Never	68.0%	27.6%	4.4%
2011 Missing Smoking Status	43.9%	49.2%	6.9%

Removing PVD [not collected in 2006], and recalculating the 2004 data showed [Current Smoker versus Non Smoker] 78.4% versus 75.3% had no complications reported, 21.2% versus 23.3% had 1-2 complications and 0.5% versus 1.5% had 3+ complications [**Table 26a**]

The respective data for 2006 involved the additional data on Past Smokers as well as Never Smoked. For comparison with the 2004 data we compared Current Smoker versus Past Smoker + Never Smoked combined as 'Non Smokers'. The data were similar : [Current Smoker versus Non Smoker] 76.9% versus 76.0% had no complications reported, 23.1% versus 22.4% had 1-2 complications and 0.0% versus 1.7% had 3+ complications.

Further assessment revealed that, [as was the case in 2004 and 2006], Current Smokers were younger [mean age 50.9 $\pm$ 14.4 versus 58.6 $\pm$ 16.2 years] with a shorter mean duration of diabetes [10.2 $\pm$ 8.7 versus 12.9 $\pm$ 10.1 years].
Combining Current plus Past Smokers [ie those who have 'Ever' Smoked], and comparing them to those stated to have 'Never' Smoked revealed that in 2006 [and 2009] respectively, there were substantially less with NO complications amongst those who had 'Ever' smoked being 68.3% [48.2% 2009] versus 82.4% [73.7% in 2009].

This substantial difference remained in 2009 after removing PVD [which was not collected in 2006] – (see Table 26[a]) being 55.5% ['Ever' Smoked] versus 78.9% ['Never' Smoked].

The full adjusted data for 2009 and 2011 [with comparison to 2004 and 2006 data] are shown in **Table 26[a]** (over).

Table 26[a] Vascular Complications and Smoking Adjusted [Adult Forms Only]

Vasular Complications (no PVD) Smoking Status	No Vasc Complications	1-2 Vasc Complications	3+ Vasc Complications
2004 Current	78.4%	21.2%	0.5%
2004 Non Smoker	75.3%	23.3%	1.5%
2006 Current	76.9%	23.1%	0.0%
2006 Past	65.4%	32.8%	1.8%
2006 Never	82.4%	16.1%	1.5%
2006 Current + Past	68.3%	30.3%	1.4%
2006 Past + Never	76.0%	22.4%	1.7%
2009 Current	72.8%	25.6%	1.7%
2009 Past	49.5%	47.0%	3.5%
2009 Never	78.9%	19.6%	1.5%
2009 Current + Past	55.5%	41.5%	3.1%
2009 Past and Never	66.5%	31.1%	2.4%
2009 Missing Smoking Status	67.4%	30.9%	1.7%
2011 Current	74.2%	25.5%	0.3%
2011 Past	61.3%	36.6%	2.1%
2011 Never	81.8%	16.7%	1.5%
2011 Current + Past	64.7%	33.7%	1.6%
2011 Past and Never	74.0%	24.2%	1.7%
2011 Missing Smoking Status	57.6%	40.0%	2.4%

Thus, with the benefit of data on Past Smokers, the increased in vascular complications seen in these individuals is consistent with what would be expected. One interpretation of these data is that individuals cease smoking when a complication develops [and are thus no longer Current Smokers in ANDIAB surveys].

In 2011, this substantial difference also remained after removing PVD [which was not collected in 2006] – (see Table 26[a]) being 64.7% ['Ever' Smoked] versus 81.8% ['Never' Smoked].

The substantial difference remains when considering those with 1-2 Vascular Complications (excluding PVD) where the figures are 33.7% ['Ever' Smoked] versus 16.7% ['Never' Smoked] – the respective figures in 2009 were 41.5% ['Ever' Smoked] versus 19.6% ['Never' Smoked].

[c] Cardiac Disease and Lipid Therapy

Table 27 shows the analysis of the Cholesterol levels [Target ≤ 4 mmol/l] and Lipid Therapy [LipRx] status of individuals reported to have *ever* had a Myocardial Infarct or CABG/Angioplasty. Of 623 individuals, 34.8% were above target despite 90.8% receiving Lipid Therapy [with mean Total Cholesterol 4.8 mmol/l and 9.2% NOT on Lipid Rx at all!].

Table 27 Cardiac Disease and Anti-Lipid Rx [Adult Forms Only]

Any Infarct, CABG or Stroke

Chol	LipRx	N	% in Category	%	Mean Chol	Mean HDL	Mean TG	Mean LDL
Chol > 4	No	20	9.2%		5.0	1.2	1.8	2.8
Chol > 4	Yes	197	90.8%		4.8	1.2	2.4	2.6
Total		**217**		**34.8%**				
Chol ≤ 4	No	22	5.4%		3.5	1.2	1.2	1.7
Chol ≤ 4	Yes	384	94.6%		3.3	1.0	1.6	1.5
Total		**406**		**65.2%**				
		623		*100.0%*				

Cardiac Disease is: the occurrence of CABG / Angioplasty and/or Myocardial Infarction, either in the past 12 months or previously [ie Any CABG or Infarct].

[d] Vascular Disease and Anti-Hypertensive Therapy

Finally, **Table 28** shows the analysis of the Blood Pressure levels [Target ≤ 130/80] and Anti-Hypertensive Therapy [AntiHT Rx] status of individuals reported to have *ever* had Vascular Disease [Myocardial Infarct, CABG/Angioplasty or Stroke]. Of 837 individuals, 50.8% were above target despite 94.4% receiving Therapy [mean BP 146/76] and 5.6% NOT on BP Rx!.

Table 28 Vascular Disease and Anti-Hypertensive Rx [Adult Forms Only]

Any Infarct, CABG or Stroke

BP	AntiHT Rx	N	% in Category	%	Mean BP [Mean ± SD]
BP > 130/80	No	24	5.6%		142 ± 13 / 79 ± 10
BP > 130/80	Yes	401	94.4%		146 ± 15 / 76 ± 11
Total		**425**	**100.0%**	**50.8%**	
BP ≤ 130/80	No	44	10.7%		117 ± 9 / 66 ± 8
BP ≤ 130/80	Yes	368	89.3%		118 ± 10 / 68 ± 8
Total		**412**		**49.2%**	
		837		*100.0%*	

Table 23[b] - Missing Data – Adult sites

Adult Forms	2004 (n = 3046)		2006 (n = 1624)		2009 (n = 6029)		2011 (n = 4629)	
	N=	%	N=	%	N=	%	N=	%
HbA1c : upper limit		0.0%		0.0%	0	0.0%		0.0%
Microalbumin (Only patients with defined uAlbumin units)	34	1.6%		0.0%	69	2.0%	9	0.3%
Sex of Individual	21	0.7%	10	0.6%	105	1.7%	24	0.5%
Initial Visit	37	1.2%	12	0.7%	866	14.4%	29	0.6%
Age	20	0.7%	9	0.6%	30	0.5%	49	1.1%
Date Of Birth	20	0.7%	9	0.6%	29	0.5%	49	1.1%
Type of Diabetes	27	0.9%	6	0.4%	154	2.6%	60	1.3%
Blood pressure - Systolic	191	6.3%	69	4.2%	567	9.4%	145	3.1%
Blood pressure - Diastolic	191	6.3%	69	4.2%	569	9.4%	145	3.1%
Duration	63	2.1%	14	0.9%	376	6.2%	148	3.2%
Year of diagnosis	63	2.1%	14	0.9%	334	5.5%	148	3.2%
Management method	92	3.0%	8	0.5%	301	5.0%	157	3.4%
Weight	146	4.8%	29	1.8%	292	4.8%	174	3.8%
Peripheral Neuropathy	275	9.0%		0.0%	988	16.4%	202	4.4%
Peripheral Vascular Disease (Adult forms only)	285	9.4%		0.0%	1113	18.5%	224	4.8%
Management Method - Insulin		0.0%		0.0%	956	15.9%	276	6.0%
If on Insulin: Since (year) (Only patients using Insulin)	204	13.1%	15	1.7%	481	13.3%	244	8.1%
Glycated Haemoglobin	183	6.0%	113	7.0%	1162	19.3%	385	8.3%
Pregnant: Currently (Adult forms only, Females, 15-55 yrs only)	76	15.1%	24	9.1%	314	27.1%	102	11.6%
On Anti-Lipid Therapy	882	29.0%	260	16.0%	1157	19.2%	550	11.9%
CABG: previous (Adult forms only)	331	10.9%	113	7.0%	1547	25.7%	586	12.7%
Management Method - Diet Only		0.0%		0.0%	960	15.9%	613	13.2%
Height (Adult forms only)	267	8.8%	81	5.0%	1352	22.4%	624	13.5%
Body Mass Index	292	9.6%	89	5.5%	1248	20.7%	640	13.8%
Microalbumin units (Only patients with a uAlbumin result)	69	3.2%	14	1.2%	124	3.6%	453	15.0%
Stroke: new (Adult forms only)	600	19.7%	81	5.0%	2307	38.3%	740	16.0%
Blood pressure - On anti-hypertensive treatment	467	15.3%	282	17.4%	1462	24.2%	748	16.2%
Severe hypoglycaemia (Adult forms only)	453	14.9%	80	4.9%	2248	37.3%	752	16.2%
Lower limb amputation - new (Adult forms only)	599	19.7%	79	4.9%	2264	37.6%	753	16.3%
Blood pressure - On antihypertensive treatment (Patients aged 18yrs+ only)	461	15.3%	279	17.3%	1451	24.3%	740	16.3%
Myocardial infarction: new (Adult forms only)	604	19.8%	94	5.8%	2335	38.7%	759	16.4%
End stage renal disease: new (Adult forms only)	601	19.7%	86	5.3%	2347	38.9%	769	16.6%
Blood pressure - On ACE inhibitor (Only patients on anti-hypertensives)	123	7.0%	64	7.1%	698	22.2%	445	16.9%
Antiplatelet-ClopidogrelTherapy(Adult formsonly)		0.0%		0.0%	2228	37.0%	811	17.5%
Blood pressure - On A2 + Thiazide (Only patients on anti-hypertensives)		0.0%		0.0%	915	29.1%	473	17.9%
eGFR over 60 (Adult forms only)		0.0%		0.0%		0.0%	832	18.0%
Lower limb amputation - previous (Adult forms only)	355	11.7%	118	7.3%	2947	48.9%	839	18.1%
Past history of ulceration	151	5.0%		0.0%	1601	26.6%	842	18.2%
Current foot ulcer (Adult forms only)	276	9.1%		0.0%	1599	26.5%	854	18.4%
Blood pressure - On ACE + Thiazide (Only patients on anti-hypertensives)		0.0%		0.0%	917	29.1%	491	18.6%
Creatinine	918	30.1%	223	13.7%	2287	37.9%	862	18.6%
Blood pressure - On A2 Antagonists (Only	148	8.5%	111	12.3%	921	29.3%	492	18.7%

patients on anti-hypertensives)				

Table 23[b] - Missing Data – Adult sites [continued]

Adult Forms	2004 (n = 3046)		2006 (n = 1624)		2009 (n = 6029)		2011 (n = 4629)	
	N=	%	N=	%	N=	%	N=	%
Management Method - Metformin		0.0%		0.0%	1879	31.2%	891	19.2%
Attended Diabetes Educator (Adult forms only)	574	18.8%		0.0%	2595	43.0%	915	19.8%
Blood pressure - On Calcium Antagonists (Only patients on anti-hypertensives)	171	9.8%	109	12.1%	971	30.9%	522	19.8%
Indigenous - ATSI	611	20.1%	133	8.2%	2637	43.7%	940	20.3%
Blood pressure - On Beta Blockers (Only patients on anti-hypertensives)	158	9.0%	128	14.2%	1023	32.5%	538	20.4%
Attended Podiatrist (Adult forms only)	748	24.6%		0.0%	2664	44.2%	948	20.5%
Lipids - Fasting Lipids (Only patients with any Lipid results)	504	19.9%	150	11.7%	1518	35.8%	740	20.9%
Antiplatelet-Aspirin Therapy(Adult forms only)		0.0%		0.0%	2295	38.1%	998	21.6%
Attended Dietitian (Adult forms only)	610	20.0%		0.0%	2742	45.5%	1020	22.0%
On Anti-Lipid Rx - Statin Rx (Adult forms only)		0.0%	312	19.2%	1999	33.2%	1027	22.2%
Management Method - Sulphonylurea		0.0%		0.0%	2179	36.1%	1093	23.6%
Lipids - Cholesterol	527	17.3%	344	21.2%	1821	30.2%	1103	23.8%
Blood pressure - On A2 + Thiazide		0.0%		0.0%	2381	39.5%	1133	24.5%
Lipids - Triglycerides	608	20.0%	388	23.9%	1999	33.2%	1142	24.7%
Blood pressure - On ACE + Thiazide		0.0%		0.0%	2384	39.5%	1145	24.7%
CABG: new (Adult forms only)	606	19.9%	81	5.0%	2264	37.6%	1162	25.1%
Blindness: new (Adult forms only)	702	23.0%	88	5.4%	2803	46.5%	1173	25.3%
Management Method - Glitazone		0.0%		0.0%	2460	40.8%	1214	26.2%
Management Method - DPP4Inhibitor		0.0%		0.0%	3128	51.9%	1223	26.4%
Myocardial infarction: previous (Adult forms only)	346	11.4%	161	9.9%	2153	35.7%	1229	26.6%
Management Method - Acarbose		0.0%		0.0%	2540	42.1%	1232	26.6%
On Anti-Lipid Rx - Fibrate Rx (Adult forms only)		0.0%	469	28.9%	2582	42.8%	1235	26.7%
Blood pressure - Other (Only patients on anti-hypertensives)		0.0%		0.0%	1351	42.9%	705	26.7%
Stroke: previous (Adult forms only)	349	11.5%	119	7.3%	2177	36.1%	1238	26.7%
Management Method - GLP1Agonist		0.0%		0.0%	3158	52.4%	1251	27.0%
Smoker: currently	342	11.2%	168	10.3%	1199	19.9%	1252	27.0%
Smoking Status		0.0%	195	12.0%	1498	24.8%	1254	27.1%
eGFR Result		0.0%		0.0%		0.0%	1269	27.4%
Blindness: previous (Adult forms only)	496	16.3%	173	10.7%	2989	49.6%	1273	27.5%
End stage renal disease: previous (Adult forms only)	363	11.9%	172	10.6%	2982	49.5%	1277	27.6%
Foot Deformity (Adult forms only)	498	16.3%		0.0%	2819	46.8%	1279	27.6%
Impotence: previous (Adult forms only , Males)	311	19.4%	169	19.4%	1695	54.0%	686	27.7%
Active Foot Lesion (Adult forms only)	836	27.4%		0.0%	2838	47.1%	1288	27.8%
On Anti-Lipid Rx -Ezetrol Rx (Adult forms only)		0.0%	461	28.4%	2665	44.2%	1297	28.0%
Blood pressure - On ACE Inhibitor	595	19.5%	292	18.0%	2488	41.3%	1351	29.2%
Referred to Ophthalmologist	766	25.1%		0.0%	3032	50.3%	1396	30.2%
Blood pressure - On A2 Antagonists	645	21.2%	350	21.6%	2793	46.3%	1437	31.0%
Blood pressure - On Calcium Antagonists	660	21.7%	346	21.3%	2857	47.4%	1474	31.8%
Blood pressure - On Beta blockers	648	21.3%	362	22.3%	2910	48.3%	1501	32.4%
Impotence: new (Adult forms only , Males)	450	28.0%	156	18.0%	1442	46.0%	809	32.7%
Cataract Left	949	31.2%		0.0%	2354	39.0%	1539	33.2%

Table 23[b] - Missing Data – Adult sites [continued]

Adult Forms	2004 (n = 3046)		2006 (n = 1624)		2009 (n = 6029)		2011 (n = 4629)	
	N=	%	N=	%	N=	%	N=	%
Attended Optometrist	1717	56.4%		0.0%	3416	56.7%	1544	33.4%
Cataract Right	949	31.2%		0.0%	2364	39.2%	1560	33.7%
Lipids - HDL Cholesterol	927	30.4%	558	34.4%	2417	40.1%	1562	33.7%
Microalbumin - All records	873	28.7%	494	30.4%	2540	42.1%	1603	34.6%
Retina - right eye	1064	34.9%		0.0%	2763	45.8%	1609	34.8%
Retina - left eye	1067	35.0%		0.0%	2778	46.1%	1613	34.8%
Lipids - Fasting Lipids	929	30.5%	429	26.4%	2997	49.7%	1669	36.1%
Blood pressure - Thiazides (Only patients on anti-hypertensives)		0.0%		0.0%	1528	48.6%	953	36.1%
Blood pressure - Other		0.0%		0.0%	3330	55.2%	1712	37.0%
On Anti-Lipid Rx -Vytorin Rx (Adult forms only)		0.0%	471	29.0%	3102	51.5%	1714	37.0%
Lipids - LDL Cholesterol		0.0%	744	45.8%	2597	43.1%	1745	37.7%
Attended Ophthalmologist	814	26.7%		0.0%	3287	54.5%	1774	38.3%
Fundus examination (last 12 months)	1398	45.9%		0.0%	3273	54.3%	1777	38.4%
Blood pressure - Thiazides		0.0%		0.0%	3562	59.1%	2025	43.7%
On Anti-Lipid Rx - Statin Side Effects / Contraindicated (Adult forms only)		0.0%	914	56.3%	3864	64.1%	2146	46.4%
On Anti-Lipid Rx Fish Oil Rx (Adult forms only)		0.0%	471	29.0%	3876	64.3%	2166	46.8%
Management Method - Nil		0.0%		0.0%	1504	24.9%	2332	50.4%
Visual acuity (Right)	1535	50.4%		0.0%	3369	55.9%	2381	51.4%
Visual acuity (Left)	1532	50.3%		0.0%	3373	55.9%	2382	51.5%
Retinal camera	2482	81.5%		0.0%	4072	67.5%	2674	57.8%

3. Discussion

The original aim of the Australian National Diabetes Information Audit & Benchmarking [ANDIAB] initiative was to establish a quality audit program. This was to be achieved by the collection, collation, analysis, audit and reporting of clinical diabetes data in specialist diabetes services, and in so doing, the underlying objectives included, and have remained :

- To develop a quality data program;
- To provide an individual audit report for participants;
- To utilise different technologies to collect and collate data;
- To assess participant responses;
- To generate a pooled data collection report of standardised data;
- To encourage progress towards annual collection; and
- To constantly update and refine.

ANDIAB 2011 has again shown that clinical diabetes data can be collected and collated in a meaningful way, using standardised data items that are part of a nationally promulgated minimum dataset. *The original objectives that are stated above have all been addressed*.

The ANDIAB initiative has therefore evolved to encompass dual purposes. Firstly, it is a Quality Assurance – Benchmarking Activity held in Specialist Diabetes Services [Diabetes Centres and Specialist Endocrinologists Rooms] across Australia. Secondly, ANDIAB is a source of cross-sectional national de-identified data describing the clinical status of individuals with diabetes. Commenced as a one-month 'survey' audit, with the development of ANDIAB Software, (and the ability to incorporate data extracted from existing databases), sites have been encouraged to collect the data items [as an Annual Review] on a small number of individuals each clinic and hence submit data accumulated over a period of up to the prior 12 months [rather than as many as possible in the one month survey period]. The use of ANDIAB Software has declined over the years, with no-one using it in 2011.

The data are clinically relevant demographic, examination and laboratory findings that describe the clinical status of an individual at a point in time. A review of collated data for trends over time, indicates relative stability of data that we interpret to indicate that this initiative does provide an accurate picture of the status of these individuals. ANDIAB mirrors international initiatives [esp in Europe] and the Dataset was accepted as the first Clinical Dataset in the National Health Data Dictionary [NHDD]. This dataset has since been enhanced, and is now online as part of the AIHW – Metadata Online Registry ['METeOR'] as the Diabetes (clinical) Data Set Specification at – [see AIHW website]:
http://meteor.aihw.gov.au/content/index.phtml/itemId/304865

The Commonwealth has supported this initiative through funding of six of these collections and the 2003 follow-up review, as well as support for a Project Officer to develop the NHDD submission. The National Diabetes Data Working Group [NDDWG] oversees the Dataset, and the National Association of Diabetes Centres [NADC] coordinates the ANDIAB collections. ANDIAB Data have assisted in the provision of data for several diabetes indicators reported by the AIHW.

The Commonwealth funded ANDIAB Project 2011-2012 has provided funds for ANDIAB 2011 [plus an ANDIAB2 collection in 2012] *and* for the ANDIAB database application to be further reviewed and enhanced. A Data Programmer has been employed to undertake these tasks.

ANDIAB is now a well established Quality program and Data Collection exercise in an environment that still lacks good data systems. Participants obtain important information on their service provision via an external national benchmarking process. The data reflect the current health status of patients and indicate what is happening in practice. Comparison with

previous collections can provide information on service delivery trends. Future surveys could be targeted to address specific issues or patient populations.

ANDIAB has used a simple [one-page] data collection instrument to collect a standardised dataset of demographic, clinical, biochemical and outcome data on people with diabetes attending specialist diabetes services across Australia. The 2011 collection has built on and further enhanced the 1998, 1999, 2000, 2002, 2004, 2006 and 2009 collections, with the addition of just two new fields (eGFR and eGFR Result).

The 2011 de-identified cross-sectional data were pooled and analysed, and the results which form the basis of this report, provide a snapshot of the clinical status of these people with diabetes. These data are summarised :

[a] in Tables 6, 7 & 8 {Risk Factor Data; Complications/ Events in the last 12 months and prior to the last 12 months; Current Data}[pp 12-13], and
[b] in the Final Report - Pooled Data (December 2011) [*Appendix 7*] where they are compared with data from previous years' surveys.

Participating specialist diabetes services receive individualised feedback in the form of an audit report comparing their patient profile with other participants. This assessed process and outcome findings for all data fields, to enable individual specialists/sites to compare and benchmark their practice findings against other participating individual specialists/sites. This indvidualised feedback also provided up to 6 year data comparison reports to enable sites to compare their 2011 results with data from their participation in previous ANDIAB surveys. A questionnaire seeking feedback regarding this report was forwarded to each participant, and the responses received, (along with those from the post data collection questionnaire), will be used to determine the content and format of future survey reports.

Missing Data

The missing data were [where relevant] adjusted and reported conditionally [for example, pregnancy for female only]. Overall, data completeness varied considerably. In contrast to previous years where the majority of fields were over 80% complete, in 2011 a significant percentage of Fields were missing. Whilst indeed, some data items were almost 100% collected, overall Missing Data ranged from [n=24] 0.5% [Sex of Individual] to [n=2674] 57.8% [Retinal Camera], thence [n=2382] 51.5 % [Visual Acuity-Left] and [n=2381] 51.4% [Visual Acuity-Right]. There were 13.9% of the data items less than 20% missing {[0-5] 5.2% / [5-10] 3.5% / [10-15] 2.6% / [15-20] 2.6%}, 27.8% were missing from 20-40% of records and 58.3% were missing from >40% of records [Table 24].

Several considerations need to be made when addressing these findings:

- Firstly, a significant amount, [1300 of the 4629 individuals of the data provided], came from established in-house databases [ie Electronic data]. Some data fields not recorded in these databases have contributed to the increased amount of Missing Data overall.
- Many multiple item fields were left empty when completing forms – eg – Management Method, where Diet Therapy was YES, this would often result in the remaining options being left empty rather than being marked NO. These must be counted as missing.
- Where relevant data are reported as conditional [eg only recording a BP therapy option as missing in those ON BP therapy], nevertheless, this cannot be done for all fields.
- We have contributed to this in some ways, by application of the Validation Rules by:
    - *increasing* missing data in some fields, by removing incorrect / impossible results;
    - *decreasing* missing data in some fields by other data manipulations [eg the eGFR and eGFRresult fields - where in cases when an eGFR result was provided, but the eGFR Yes/No field was empty – we have changed this to Yes or No appropriately].

- Finally also, as in previous years – Eye data items were poorly recorded (although less so than previously) and this remains an ongoing problem presumed to result from the fact that an eye data report may not be available in initial visit individuals [14.2% in 2011]. It is unlikely however that this information is not sought by Diabetes Centres and specialists, but most likely in fact that the information is unknown to them.

Taking these facts into account means that it is difficult to draw conclusions from a comparison of 'ANDIAB Process performance' to previous years.

Whilst the amount of Missing Data remains less than ideal, attempts to address missing 'vital' data fields [by seeking review by sites] were again successful in improving data completeness this year, as shown in Table 24a [page 24].

General Comments

As in previous surveys, in addition to 'chasing' missing data, correcting data and removing duplicate records [pp 8-9], data were 'normalised' where possible to enable comparison (HbA1c and microalbumin / proteinuria, relative to the upper limit of normal range). Whilst every effort has been made not to over-interpret any of the data from this initiative, they do represent important current data that when referenced in context, provide hitherto unavailable data on the status of individuals attending specialist diabetes services. Indeed it is noteworthy that some of these data, (including blood pressure and lipids), have been previously utilised by the AIHW as a data source for several national diabetes indicators [including those reported in the NHPA (National Health Priority Area) Diabetes biennial Report provided to all Health Ministers in 1999[7], 'Australia's Health' 2000, 2004, 2006 and 2008[16] which reported complications data, 'Diabetes: Australian Facts' 2002 and 2008[17], and 'Use of medicines by Australians with diabetes'[18]]. Additionally, ANDIAB has again been recently acknowledged as a valuable potential source of diabetes data[19, 20].

There is also the potential within the data to look at other issues, for example:

- mean HbA1c, BMI, age and diabetes duration, for Type 2 diabetes individuals treated with diet only versus tablets alone versus insulin alone versus treatment with insulin and tablets [presented in Appendix 7 with comparison to previous ANDIAB surveys],

or to undertake other calculations such as the following:

- LDL Cholesterol data [see page 22];
- Glomerular Filtration Rate [see pp 29-31]; and
- Complications Assessments [see pp 33-36].

The survey format [and ANDIAB Software data storage (not used in 2011)] seeks a Yes/No response to most data items including the existence of various complications. There is relevance in not only considering the Yes responses, but also giving consideration to the significance of the No responses [as show in Table 7b[1] and, of most relevance, 7b[2] (paper forms) page 14], where in 6 of the 7 items, over 64% and 84% respectively, of Adult Forms data responses overall, were reported as NO for these complications.

The new items from 2009 on specific Oral Hypoglycaemic Agents (retained in 2011) have provided data not previously sought in ANDIAB, and the findings and analyses presented on page 32 give insight into the individual therapies and combinations in use. Similarly, data on combinations of Antihypertensive and Lipid Lowering Therapies, and on Aspirin / Clopidogrel use, provide useful comparative data across several ANDIAB Surveys.

Because the data have standardised definitions, and the dataset is internationally compatible, the possibility to compare and benchmark with others also exists, and indeed has occurred[21].

ANDIAB 2011 had participation of *every* State and Territory (except NT), with the equal second largest number of participating sites [42] since 1999, and the fourth largest number of individuals' data ever reported [4629]. By these criteria it has been a successful initiative again this year.

Methodology & Data Verification Issues in 2011

This year [as in previous ANDIAB collections], Age, {which was previously calculated as an integer [year of survey minus year of birth]}, was calculated in days [full date of survey minus full date of birth] and thence converted to years by dividing by 365.25. In the Final Report - Pooled Data (December 2011) [*Appendix 7*], 1998 & 1999 Age data were recalculated in line with year 2011 survey methodology for the purposes of direct comparison.

It should be noted that **duration of diabetes** was calculated from a 'Year of Diagnosis' field. As noted on page 26 [and as in 1999 onwards], we have grouped those diagnosed in 2010 or 2011 in a ≤ 18 months duration category. The calculations differ from 1998, where "…if this year was 1998 (the year of the survey) then the duration was 1998-1998=0 years, and if 1997 was 1998-1997=1 year. As the project was conducted mid-year [May/June 2011], duration of diabetes was calculated as: [2011 minus stated 'Year of Diagnosis']. The resulting integer would be 0 if diagnosed in 2011, and 1 if diagnosed in 2010 [and in fact a maximum of 18 months – 1 Jan '10 diagnosis to 30 Jun '11 survey]. Duration 18 months-5 years is thus a minimum 18 months {Dec '09 diagnosis to Jun '11 survey} to 5 years [2006-2011].

This has relevance for comparing and interpreting data using diabetes duration calculations [Tables 19 & 20 (pp 25-26) 1998] and [Tables 18 & 21 (pp 26 & 28) 2011]. Direct comparisons *can* be made with 1999 through to 2011 data, which used the same methodology.

In the Renal Failure and Erectile Dysfunction Fields, where there was a Yes recorded for both fields 'developed *in* the past 12 months' AND 'developed *prior* to the last 12 months' [which is clearly not possible], the assumption was made that this Complication/Event had developed *prior* to the last 12 months [and was thus still present]. In these instances, the 'Yes' values in the field 'developed *in* the past 12 months' were ignored when calculating prevalence [See Table 7[a] page 12].

Instances of reported Blindness and Renal Failure were verified with sites wherever the Visual Acuity data or Serum Creatinine respectively did not appear to match these diagnoses.

Limitations of ANDIAB

It is acknowledged that some data have small sample sizes because some sites sent minimal data for some fields.

For retinal examination there was an ability to store in the database only one of 'Diabetes Abnormality' or 'Non Diabetes Abnormality', and when both were recorded, the 'Diabetes Abnormality' was chosen. As a result the incidence of 'Non Diabetes' related eye disease is an underestimate.

There is an acknowledged inability to verify all data items, and sites are not always resourced to adequately respond to data enquiries. The collection needs to rely on the "Data Assumptions, Decisions and Data 'Manipulations'" that are detailed in Section 1.6 [page 9].

Data 'Stability'

Comparison of results from the eight years of ANDIAB surveys [1998-2000, 2002, 2004, 2006, 2009 and 2011] indicates a significant 'stability' of findings that suggests that these data do reliably represent the clinical status of individuals with diabetes attending specialist diabetes services in Australia {see Final Report-Pooled Data (December 2011) [*Appendix 7*]}.

Despite the overall 'data stability' noted above, and whilst these data are cross-sectional, and on different individuals from different sites in different years, it is interesting to note some differences which may reflect changes in clinical practice. These include [compared to 2009 data]:

- 4.8% more individuals reported to be on Anti-hypertensive therapy;
- 7.3% more individuals reported to be on Anti-lipid therapy.

Whilst these could indeed just be differences in clinical practice in different sites, it is interesting to speculate that over time, the changes [a gradual general increase], reflect changes in clinical practice resulting from the findings of studies such as the UKPDS which highlighted the importance of risk factor assessment and management, as well as blood glucose control, in the overall management of Type 2 diabetes.

Thus whilst no direct comparisons can be drawn from cross-sectional data on different individuals from different sites, the above observations do suggest that individuals attending specialist diabetes services are requiring more therapeutic interventions and are receiving increasing assessment and management of known risk factors in an attempt to maintain their health and prevent or delay complications.

The Future

In its current form, with a minimal number of sites with in-house databases providing data (and thus a reliance on scannable paper form technology), ANDIAB will, in our view, be difficult for sites to sustain. There needs to be a concerted effort by Specialist Diabetes Services to acquire electronic databases from which they can not only run their day-to-day activities and communicate with referring health professionals, but also undertake research and participate in quality initiatives such as ANDIAB. If most sites had in-house databases the potential would exist to extract data more frequently and provide comparative audit reports, perhaps again on an annual basis.

Another issue of concern relates to the 'repetitive' nature of the data collection, a concern raised at the Best Practice and Diabetes Centres [BPDC] Meeting in July 2011. It was suggested that an alternative could be a smaller and/or more targeted data collection if ANDIAB continues in the future. A further option could be to conduct a longitudinal follow-up review analysis as was done in 2003, however this would be labour intensive for Sites and possibly a less attractive alternate option.

The collection will most likely be repeated in future years, at least biennially, but the above considerations need to be heeded. If more Diabetes Centres develop electronic databases, the potential exists to extract data more frequently and provide comparative audit reports perhaps again on an annual basis.

As stated above, another possibility is for future surveys to be targeted to address specific issues or patient populations.

4. Summary, Conclusions and Recommendations

Since the initial 1998 pilot, the data collection form has been improved with changes that were predominantly enhancements to the collection. The additional fields collected in the 1999, 2000, 2002, 2004, 2006, 2009 and 2011 collections have enhanced the value of this exercise by providing additional data on individual's status.

In summary, ANDIAB provides a 'snapshot' of the clinical condition of people with diabetes attending specialist diabetes services across Australia. It is important to record that there were no difficulties in the technical aspects of ANDIAB. A comparison with previous years' data reveals a degree of 'stability' of the findings that suggests that these data do reliably reflect the clinical status of these individuals and could be used as a basis on which to gauge the effectiveness of diabetes management or intervention strategies aimed at improving health outcomes.

Finally, it should be noted that the Commonwealth funded ANDIAB Project 2011-2012 has provided funds not only for ANDIAB 2011, but also an ANDIAB2 collection in 2012 and for the Central ANDIAB database application to be further reviewed and revised. This has been happening progressively and will result in several improvements. Of note is that there were several enhancements to ANDIAB reporting capabilities in 2009, one of which is our ability to provide FULL Site and Doctor Reports, *and* this Final Report of Pooled Data, in .pdf format, including all Tables and Graphs. Thus, because of the way reports are now generated, we have the ability to provide participants with complete electronic as well as hard copy reports – [the former having not been previously possible].

We conclude that this clinical audit and benchmarking exercise has again provided cross sectional data on the people with diabetes attending specialist diabetes services and will form the basis of ongoing diabetes data collection. All of ANDIAB's stated objectives were met.

We recommend

- That ANDIAB continue as a regular diabetes audit activity in specialist diabetes services;
- That said, there needs to be a concerted effort by Specialist Diabetes Services to acquire electronic databases from which they can not only run their day-to-day activities and communicate with referring health professionals, but also undertake research and participate in quality initiatives such as ANDIAB;
- That further improvements to the format of the data that are collected be supported in order to ensure the relevance of this exercise to participants is retained. This should include consideration of smaller and/or more targeted data collection in the future, or perhaps a longitudinal follow-up review analysis as was done in 2003; and
- That ANDIAB could be extended to include data from other relevant clinical practice settings.

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