



Australian Government

Australian Institute of
Health and Welfare

Costs of Diabetes in Australia, 2000–01

Highlights

- Health system expenditure on diabetes in 2000–01 was estimated at around \$784 million, 1.7% of allocatable recurrent health expenditure, ranking diabetes fifteenth out of around 200 disease groups compared.
- Average health expenditure on diabetes in 2000–01 was \$1,469 per known (self-reported) case of diabetes, or \$42 per Australian.
- In 2000–01, \$204 million was spent by the Australian Government and people with diabetes on antidiabetic drugs and diabetes testing reagents.
- Although only 10% of the 4.6 million prescriptions for antidiabetic drugs in 2000–01 were for insulin, these accounted for 60% of expenditure on antidiabetic drugs.
- Given that Type 2 diabetes is largely preventable, there is potential for substantial savings for governments, public and private companies and services, and individuals.

Introduction

Diabetes mellitus is estimated to affect around one million Australians, a number that is likely to increase in the future because of population ageing and increasing prevalence of risk factors such as obesity. It is estimated that up to half of those affected are unaware they have the condition which, if untreated, can lead to complications involving many parts of the body, particularly the heart, kidneys, eyes and feet.

Diabetes accounted for 5% of the total burden of disease in Australia in 1996 (AIHW: Mathers et al. 1999). People with diabetes, particularly those with complications, are more likely to use health services than people without diabetes, and to use them more often and for longer periods of time (Ramsey et al. 2002). Diabetes was implicated in over 8% of all deaths in

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Australia in 2002, either as the underlying or an associated cause of death. In 2002–03, diabetes was the sixth most common problem managed by general practitioners (GPs), managed in almost 3 out of every 100 GP encounters (AIHW: Britt et al. 2003), and was involved in 6% of all hospital separations (AIHW 2004a). In 2003, human insulin was the thirteenth most costly drug to the Australian Government with Pharmaceutical Benefits Scheme (PBS) payments of over \$79 million—about 2% of all PBS benefits (DoHA 2003, AIHW 2004b). Drugs used to treat diabetes accounted for 4% of costs of all prescription drugs listed in the PBS in 2000 (DoHA 2003). In 2003 more than 86,000 Australians had a disability caused mainly by diabetes (ABS 2004).

Diabetes places a large burden on health care systems in terms of expenditure on hospitalisations, aged and other care, medications, diagnostic services, and other out-of-hospital medical care including general practice and community health services. Non-health care and indirect costs borne by governments, private health insurers, and people with diabetes can also be substantial. This bulletin brings together available data on costs of diabetes in Australia and provides detailed expenditure data not previously published. It draws on data from the AIHW Disease Expenditure Database (AIHW 2004c) to examine the direct health expenditure (see Box 1) on diabetes in 2000–01. These data are the most recent available and are supplemented by estimates of some indirect and non-health care costs of diabetes from the DiabCost study (Colagiuri et al. 2003) and other published sources.

It should be emphasised that expenditure and costs (see Box 1) relating to a disease are not the only indicators of the size of the problem or the total burden of that disease on the community. Nor do they in themselves provide an indication of the priority for intervention or the need for additional resources. Expenditure on one disease may be higher than on another simply because the first disease is more expensive to treat and not because it is more common or more serious than the second. Estimated expenditure does not directly equate to savings in money, resources or lives that would result from the prevention of the disease. Other factors, for example the proportion of expenditure arising from fixed costs such as salaries or the effectiveness of interventions, need to be taken into account when estimating potential savings or allocating resources.

Box 1: Definitions

The following terminology is used in this bulletin:

'Expenditure' refers to money spent to provide or obtain goods or services, in this case to prevent, diagnose, treat and manage diabetes and its complications.

'Costs' refers to any outlay of resources (money, labour or time) or losses incurred as a result of a disease. Expenditure therefore is a specific component of total costs. Costs due to diabetes include potential income lost, reduced quality of life, or years of life lost due to the effects of diabetes, as well as expenditure by individuals, public or private companies, or governments on health services or medications.

What is diabetes?

Diabetes is a chronic (long-term) condition in which levels of glucose in the blood are abnormally high. Normally, the pancreas produces a hormone called insulin which helps the body to process glucose (a type of sugar) for energy. When a person has diabetes, the body does not produce enough insulin or it cannot use insulin properly. This means the glucose is not able to be used, and the body will instead start to break down its own fat and muscle for energy. Diabetes may lead to severe problems including damage to the heart, blood vessels, eyes, nerves and kidneys.

There are three main types of diabetes: Type 1, previously called 'juvenile-onset' or insulin-dependent diabetes mellitus (IDDM); Type 2, previously referred to as 'adult-onset' or non-insulin-dependent diabetes mellitus (NIDDM); and gestational diabetes. These three types account for 98–99% of all diagnosed cases of diabetes (AIHW 2002). The remaining cases include diabetes insipidus and other types of diabetes caused by medications or that developed as a result of other conditions. Only Type 1 and Type 2 diabetes are dealt with in this bulletin.

Type 1 diabetes

In Type 1 diabetes, the body destroys its own insulin-producing cells, called beta-cells, in the pancreas. People with Type 1 diabetes have a total or near-total lack of insulin, and require daily insulin therapy to survive. This type of diabetes accounts for 98% of all diabetes in childhood, and about half of all people with Type 1 diabetes develop the disease before age 18. Type 1 diabetes makes up 10–15% of all known diabetes cases in Australia (ABS 1997). Based on self-reported information from the 2001 National Health Survey, an estimated 95,000 Australians had Type 1 diabetes in 2001 (ABS 2002).

Type 2 diabetes

This is the most common form of diabetes, accounting for 85–90% of all diabetes cases in Australia (ABS 1997). Although it occurs much more commonly in people aged over 40 years, it can also occur in younger adults and even in children. People with Type 2 diabetes may have both reduced levels of insulin (insulin deficiency) and an inability to use insulin properly (insulin resistance). Type 2 diabetes may be successfully managed through diet and exercise programs and oral antidiabetic drugs, but many people with the condition eventually require insulin therapy. Type 2 diabetes may initially be present without symptoms and evidence suggests that up to half of all people with Type 2 diabetes are not aware that they have it. The 1999–00 Australian Diabetes, Obesity and Lifestyle Study estimated that 7% of Australians aged 25 years and over (around 900,000 people) had Type 2 diabetes, but only 50% of people who tested positive knew they had the condition (Dunstan et al. 2002). Undiagnosed or poorly managed Type 2 diabetes may lead to serious complications such as coronary heart disease and kidney disease.

Treatment of diabetes

Daily management of Type 1 diabetes involves regular blood glucose testing, control of diet and exercise, and multiple insulin injections or the wearing of an insulin pump. There are several types of insulins which vary in the speed at which they work and the

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length of time they remain in the body. Sometimes combinations of different insulins are used to allow better control of glucose levels.

For Type 2 diabetes, day-to-day management involves control of lifestyle factors such as activity levels and diet, and may also include the use of oral blood-glucose-lowering drugs or insulin injections. There are a number of different types of oral blood-glucose-lowering drugs that can be used alone or in combination, which work in various ways to reduce the amount of glucose in the blood.

Monitoring of all aspects of diabetes is essential to preserve quality of life and limit the short- and long-term effects of the condition. Management of diabetes can be complex and requires a collaborative approach involving the person with diabetes, the carers, the diabetes educator, the GP, and other health service providers such as endocrinologists, podiatrists, ophthalmologists and optometrists, kidney specialists, and dietitians. General management involves control of blood glucose levels, weight, and blood lipid and blood pressure levels, a good diet, appropriate physical activity and not smoking, as well as regular screening for the development of complications such as foot ulcers, kidney disease and eye problems. Guidelines in Australia describe a specific cycle of care for diabetes, detailing management goals and outlining a cycle of measurement of risk factors, screening for complications, and referral as appropriate (DA & RACGP 2004; GPAC 2001; NSW Health Department 1996).

Data sources, methods and limitations

Disease-related costs (money, resources, time, and quality and quantity of life) fall into four broad categories:

- *direct health care costs*, which include hospital treatment, medications, GP visits, allied health and specialist care, use of diagnostic services, medical research, and residential aged or nursing care;
- *direct non-health care costs*, including transport to and from medical services, child care, and home care;
- *indirect costs*, such as lost productivity, lost income, disability, and lost years of life; and
- *intangible costs*, such as impact on quality of life.

This report mainly focuses on direct health care expenditure for diabetes—that is, money spent by governments, private health insurers, companies, households and individuals to prevent, diagnose and treat diabetes. Very little information is available in Australia on the other types of costs associated with diabetes. The recent DiabCost Australia study (Colagiuri et al. 2003) provides some estimates of direct non-health care costs, indirect costs and intangible costs relating to Type 2 diabetes, and some of these are referred to below.

Direct health expenditure

Two sources of data on direct health expenditure for diabetes are used in this bulletin: the AIHW Disease Expenditure Database and the National Diabetes Services Scheme. These two sources are described below.

The AIHW Disease Expenditure Database

The majority of data on direct health expenditure in this bulletin were drawn from the AIHW Disease Expenditure Database (AIHW 2004c). This database was compiled by allocating total recurrent health expenditure for 2000–01 to various sectors for over 200 disease and injury categories based on those used in the Australian burden of disease study (AIHW: Mathers et al. 1999). The sectors covered by the Disease Expenditure Database are:

- hospitals (admitted and non-admitted patients);
- high-level residential aged care;
- out-of-hospital medical services (including GPs, specialists, imaging and pathology);
- pharmaceuticals (prescription drugs and over-the-counter medications);
- dental;
- other professional services (such as physiotherapy, podiatry and dietetics); and
- health-related research.

Expenditure in these sectors accounted for 86% of the total recurrent health expenditure in 2000–01. The remaining 14% of expenditure was not able to be allocated to disease groups. This unallocated 14% included expenditure on ambulances, public health programs, health administration, health aids and appliances, and community health.

For admitted hospital patients, high-level residential aged care, out-of-hospital medical services, and prescription drugs, the expenditure figures are based directly on 2000–01 recurrent health expenditure data. Since data for 2000–01 were not available for the remaining areas, estimates for non-admitted patients, over-the-counter medications, other professional services, and health-related research were calculated from previously published data (for 1993–94, from AIHW: Mathers et al. 1998) adjusted for overall expenditure growth in each category and changes in the age and sex structure of the population.

All expenditure on dental services was allocated to the disease group 'oral health'. All expenditure relating to optometry, which is part of the out-of-hospital medical services sector, was allocated to the disease group 'disorders of refraction'. Therefore expenditure on dental and optometry services for people with diabetes is not included in this bulletin.

Each health dollar in the AIHW Disease Expenditure Database was allocated to one disease only, so that the sum of expenditure for all diseases was equal to the total allocatable health system expenditure. Therefore the data for diabetes do not necessarily incorporate all expenditure on diabetes complications, such as heart or kidney disease, since this would be included under expenditure for those specific diseases unless explicitly assigned to diabetes.

Further details of the methodology used in the Disease Expenditure Database are provided in *Health System Expenditure on Disease and Injury in Australia 2000–01* (AIHW 2004c).

In this bulletin, data on expenditure on pharmaceuticals specifically for the treatment of diabetes only are presented. This includes expenditure on insulins, insulin analogues and

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oral blood-glucose-lowering agents, as well as expenditure on reagents used in diagnostic testing relating to diabetes and its complications. All drugs used to treat diabetes itself are covered as these are available only on prescription. Other medications prescribed to people with diabetes which are not for the treatment of diabetes itself are excluded. Therefore the figures presented here for pharmaceutical and total expenditure differ from those presented elsewhere (AIHW 2004c) as those data will include some non-diabetes treatments prescribed to people with diabetes.

Note that hospital expenditure data for diabetes reported in this bulletin and in *Health System Expenditure on Disease and Injury in Australia 2000–01* (AIHW 2004c) are not directly comparable to those previously published for the 1993–94 financial year (AIHW: Mathers et al. 1998; AIHW: Mathers & Penm 1999). Although the methods for allocating expenditure for 2000–01 were consistent with those used for 1993–94, there has been an alteration to the Australian ICD coding standards for diabetes which has resulted in an increase in the number of hospital separations with a principal diagnosis of diabetes. Further information regarding this change and its effects can be found in AIHW: Phillips (2003). As a result of these comparability issues, no data on changes in health system expenditure between 1993–94 and 2000–01 are presented in this bulletin.

The National Diabetes Services Scheme (NDSS)

The NDSS was set up in 1987 to provide self-management products and services for people with diabetes at prices subsidised by the Australian Government. It is run by Diabetes Australia on behalf of the Australian Government Department of Health and Ageing. The NDSS provides insulin pump consumables, disposable syringes and needles, needles for injection pens, and testing strips for blood and urine, as well as education and information services to help people use these products and manage their diabetes. The state and territory governments contribute copayments for needles and syringes, making them effectively free to NDSS registrants.

Expenditure on the NDSS is part of the 14% of total health expenditure which was not allocated by disease, mostly under the 'health aids and appliances' sector, and is therefore not covered by the estimates from the AIHW Disease Expenditure Database. Australian Government expenditure on the NDSS is presented in this bulletin, but no information on the total value of patient contributions to NDSS-subsidised products is available.

Other costs associated with diabetes

Data on other types of costs (direct non-health costs, indirect costs and intangible costs) associated with diabetes were drawn from the DiabCost Australia study (Colagiuri et al. 2003). This study used a self-report survey of people with Type 2 diabetes to collect information on direct health and non-health care costs, indirect costs, and impact on quality of life. Although the sample appears reasonably representative (in terms of age and sex) of the population with Type 2 diabetes, total costs from the study underestimate the full impact of diabetes in the community as they do not cover people with Type 1 or gestational diabetes.

The estimates of direct health care costs calculated by DiabCost are not comparable with the estimates of direct health system expenditure from the AIHW Disease Expenditure Database. The AIHW data were derived using a 'top-down' approach,

taking total health system expenditure and allocating it to different sectors and diseases. The DiabCost estimates were derived using a ‘bottom-up’ approach, which collected information on specific health system costs and combined them to estimate a total. These specific cost data were obtained from self-reported information on medications, aids and appliances, and use of health services, combined with published data on prices of these items. The proportion of costs incurred for conditions other than diabetes, and the proportion that related to diabetes complications and conditions for which diabetes is a contributing cause, could not be separated from costs directly relating to diabetes. Further, the DiabCost methodology included costs relating to sectors which were not able to be allocated to diseases in the AIHW Disease Expenditure Database, such as health aids and appliances. Therefore, no DiabCost estimates of direct health care costs are presented in this bulletin.

Results

Direct health expenditure

The AIHW Disease Expenditure Database

Data on allocatable recurrent health expenditure from the AIHW Disease Expenditure Database showed that direct health care expenditure on diabetes in 2000–01 was almost \$784 million. Diabetes accounted for 1.7% of the year’s total allocatable recurrent health expenditure, ranking fifteenth out of around 200 disease groups compared (AIHW 2004c). Expenditure on diabetes included \$289 million (36.9%) on hospital services, \$183 million (23.3%) on out-of-hospital medical services, and \$204 million (26.0%) on diabetes-related pharmaceuticals (Figure 1). Expenditure rose sharply with age, ranging from around \$2 million for 0–4 year-olds to \$211 million for those aged 75 years and over (Table 1).

Table 1: Direct health expenditure on diabetes, by age group, 2000–01 (\$ millions)

Sector	0–4	5–14	15–24	25–34	35–44	45–54	55–64	65–74	75+	All ages
Hospital services										
Admitted patients ^(a)	1.0	4.8	6.0	6.6	12.2	24.9	40.3	60.9	74.2	230.9
Non-admitted patients	0.0	1.9	0.0	0.0	0.0	2.6	23.5	16.9	13.2	58.0
<i>Total</i>	<i>1.0</i>	<i>6.7</i>	<i>6.0</i>	<i>6.6</i>	<i>12.2</i>	<i>27.5</i>	<i>63.8</i>	<i>77.8</i>	<i>87.4</i>	<i>289.0</i>
Out-of-hospital medical services	0.3	0.6	1.9	5.1	13.4	34.5	39.8	51.0	36.3	182.8
Other professional services	0.0	0.0	0.4	0.1	3.6	3.4	8.5	8.8	11.1	35.9
Pharmaceuticals	0.6	2.2	5.0	8.8	16.3	30.0	45.0	57.4	38.4	203.6
Aged care homes	0.0	0.0	0.0	0.0	0.0	2.5	2.8	3.5	28.8	37.7
Research	0.1	0.5	0.6	0.9	2.1	4.7	7.6	9.2	9.1	34.6
Total expenditure	2.0	10.0	13.9	21.5	47.5	102.5	167.7	207.6	211.0	783.6

(a) Includes an estimate of in-hospital private medical services.

Note: Figures may not add to totals due to rounding.

Source: AIHW Disease Expenditure Database.

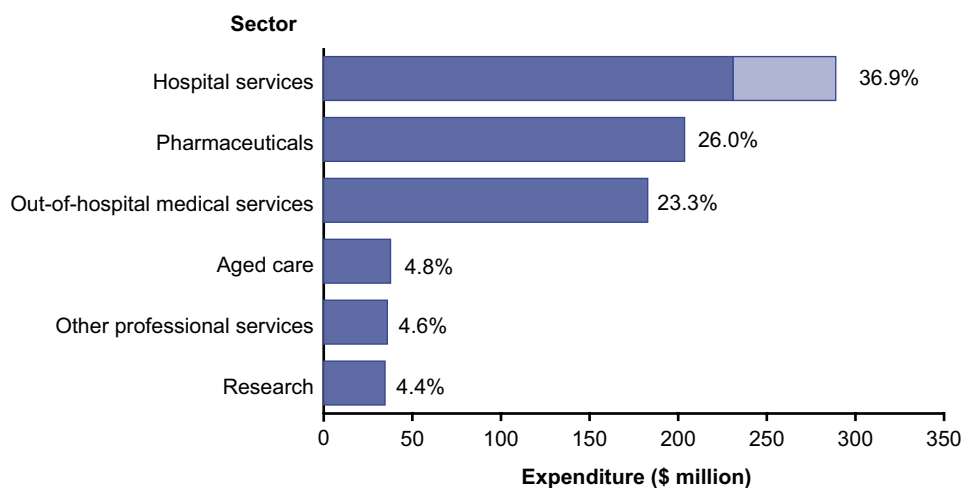
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Expenditure on Type 1 diabetes accounted for 23% of the total, at \$180 million, and expenditure on Type 2 diabetes accounted for 77% at \$599 million. The remaining \$4 million related to diabetes prevention services. Estimates of expenditure by type of diabetes should be interpreted with caution as the accuracy of recording of diabetes type is uncertain. It may be that many people recorded as having Type 1 diabetes actually have insulin-treated Type 2 diabetes.

Hospital services

Hospital services accounted for the largest portion of overall direct health expenditure on diabetes in 2000–01, at over one-third of the total (Figure 1). The majority (80%) of expenditure on hospital services for diabetes was expenditure on admitted patient services. Over three-quarters (79%) of expenditure on hospital services for diabetes related to people aged 55 or over (Table 1). Hospital services accounted for the greatest proportion of total diabetes expenditure for older people, at 41% of the total for those aged 75 and over, more than double the amount spent in any other sector. Hospital services were also the largest factor in expenditure for children, accounting for two-thirds of total expenditure at ages 5–14.

Figure 1: Direct health expenditure on diabetes, by sector, 2000–01



Source: AIHW Disease Expenditure Database.

Out-of-hospital medical services

This sector includes medical imaging (such as X-rays and ultrasound), pathology, visits to GPs and consultations with other specialists outside of hospital. In 2000–01, direct health expenditure on out-of-hospital medical services relating to diabetes was nearly \$183 million. Expenditure generally increased with age, with over two-thirds of the total (\$127 million) relating to people aged 55 and over (Table 1). Very little expenditure in this sector related to children, with less than \$1 million relating to 0–14-year-olds.

Other professional services

Types of services covered under this sector include those provided by allied health professionals, such as physiotherapists, chiropractors, podiatrists, dietitians, psychologists and osteopaths. In 2000–01 these services accounted for the second lowest proportion of diabetes-related health expenditure (after research), at just under \$36 million or 4.6% of the total (Figure 1). Expenditure in this sector related primarily to adults, and increased with age (Table 1). Note that these data are scaled from 1993–94 figures and are estimates only.

Pharmaceuticals

All of the expenditure included in this section relates to antidiabetic drugs (insulins, insulin analogues, and oral blood-glucose-lowering drugs) or diagnostic testing agents used in the treatment of diabetes. Expenditure on these diabetes-related pharmaceuticals in 2000–01 was just under \$204 million, with almost \$27 million (13%) spent on agents used in diagnostic tests for diabetes and its complications and \$177 million (87%) spent on antidiabetic drugs (Table 2). Expenditure on antidiabetic drugs comprised \$106 million and over 467,000 prescriptions for insulin, and \$71 million and over 4.1 million prescriptions for oral blood glucose lowering drugs. Note that although insulins accounted for only 10% of the total antidiabetic drug prescriptions, these made up 60% of the \$177 million spent on antidiabetic drugs.

Table 2: Prescription pharmaceuticals for the treatment of diabetes, 2000–01

Drug type	Number of prescriptions	Expenditure (\$ million)
Antidiabetic drugs		
Insulins and analogues	467,500	105.8
Oral blood glucose lowering agents	4,111,600	70.9
Total	4,579,100	176.7
Diagnostic testing agents	455,800	26.9
Total	5,034,900	203.6

Note: Figures may not add to totals due to rounding.

Source: AIHW Disease Expenditure Database.

Aged care

High-level residential aged care services accounted for just under \$38 million or 4.8% of total allocatable health expenditure on diabetes in 2000–01 (Figure 1). Expenditure related only to people aged 45 and over, and was highest in those aged 75 and over (\$28.8 million, or 76% of diabetes aged care expenditure) (Table 1). Expenditure for females was more than twice that for males (\$25.4 million compared with \$12.3 million), probably reflecting the greater numbers of females in the older age groups and in aged care facilities.

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Research

Direct health expenditure on diabetes-related research in 2000–01 (scaled from 1993–94 figures) was almost \$35 million. This research by universities and other institutions supports the understanding of the causes, extent and impact of diabetes, and the development and evaluation of new and existing treatment methods and public health interventions.

Expenditure per person and per case

Average allocatable direct health care expenditure on diabetes in 2000–01 was \$42 per Australian (AIHW 2004c). Based on self-reported information from the 2001 National Health Survey, an estimated 554,200 Australians had diabetes in 2001 (ABS 2002). Note that figures from self-reported information underestimate the true number of people with diabetes, as many cases are undiagnosed. Dividing total allocatable expenditure by the estimated number of people with diabetes gives an average allocatable expenditure of \$1,469 per case of diabetes. This includes continuing management of people with established diabetes as well as diagnosis and initial care of new cases.

The National Diabetes Services Scheme

In 2000–01 there were 493,919 people registered with the NDSS. Australian Government expenditure on the NDSS in that financial year was over \$58 million (DoHA 2004). This expenditure is in addition to that described above, as expenditure on health aids and appliances was not able to be allocated by disease group and so is not included in the AIHW Disease Expenditure Database (see p. 5).

The number of people registered with the NDSS has grown rapidly, and in 2002–03 had reached nearly 615,000, with government expenditure of over \$81 million (DoHA 2004).

Other costs associated with diabetes

Direct non-health care costs

Results from the DiabCost study estimated that average annual direct non-health care costs for people with Type 2 diabetes were \$1,065 per person (Colagiuri et al. 2003). Home support and special foods accounted for around two-thirds of these costs (40% and 28%, respectively), with transport accounting for a further 12%. There is no information available in Australia regarding direct non-health care costs for people with Type 1 diabetes.

Indirect costs

The DiabCost study estimated income lost from people with Type 2 diabetes or their carers being unable to attend work. This was relatively low, at an average of only \$35 per person per year, but the study sample had an average age of 65 years and therefore few participants were employed (Colagiuri et al. 2003). The average income lost per person increased if complications were present, particularly for carers. The impact of diabetes in terms of lost income is likely to be higher if people with Type 1 diabetes are included, since this type of diabetes generally develops at a much younger age and therefore affects

parents of children with the disease as well as employed people who themselves have Type 1 diabetes. There are currently no Australian data available on the indirect costs associated with Type 1 diabetes.

Intangible costs

Participants in the DiabCost study (people with Type 2 diabetes) overall reported a good quality of life, similar to that in the general population. However, some variation was seen by age and treatment type, and with the presence of complications. Although quality of life decreased slightly with age, quality of life in the diabetes sample became more like that of the general population as age increased. Having complications decreased quality of life compared with people without complications, but there was little variation in quality of life between different types of complications. When compared by treatment type, people whose diabetes was controlled by diet alone reported the highest quality of life, whereas those on insulin reported the lowest (Colagiuri et al. 2003).

The Fremantle Diabetes Study also reported lower quality of life in people with insulin-treated Type 2 diabetes compared with those whose diabetes was not treated with insulin (Davis et al. 2001). Results from the Fremantle Cognition in Diabetes Study showed that older people (aged 70 and over) with Type 2 diabetes had high rates of depressive symptoms and cognitive impairment, as well as poor physical functioning (Bruce et al. 2003). In the 1995 National Health Survey, adults (aged 18 years and over) who self-reported having diabetes were much less likely to rate their health as 'excellent' or 'very good' and much more likely to rate their health as 'fair' or 'poor' compared with adults who did not report having diabetes (ABS 1997).

Little information on the quality of life of people with Type 1 diabetes in Australia is available. A study of children and young people with Type 1 diabetes in Melbourne found that their general health and quality of life were poorer than those of children and young people in the general population. Lower quality of life was found to be related to poor blood glucose control in children (5–11 years) but not in 12–18 year-olds, while the presence of diabetes-related symptoms and concerns was associated with poorer psychosocial functioning for both age groups (Wake et al. 2000). Children with diabetes living in regional areas of Victoria have also been found to have lower quality of life than those from urban areas, despite similar diabetes knowledge and similar levels of glycosylated haemoglobin (HbA_{1c}) (Cameron et al. 2002).

Discussion

Diabetes places a substantial financial burden on people with the condition, their families and carers, health services and governments. In 2000–01, direct health care expenditure on diabetes totalled almost \$784 million, with over one-third (\$289 million) of this spent on hospital services and another quarter (\$204 million) on diabetes-related pharmaceuticals. This equated to almost \$1,500 per diagnosed case of diabetes, or \$42 per Australian in that year.

Diabetes becomes more common with age, and expenditure followed this pattern, with just over half of total expenditure (\$419 million) relating to people aged 65 years and over. Consistent with the clinical progression of diabetes, hospital services accounted

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for the greatest proportion of health expenditure in younger people (diagnosis and stabilisation of Type 1 diabetes) and older people (treatment for complications such as nerve and kidney diseases), whereas medication and out-of-hospital services were the greatest components of expenditure in those aged 25–54, who generally have stable diabetes with less serious (if any) complications.

Treatment for complications of diabetes or diseases for which diabetes is a contributing cause may also incur substantial costs that, with the methodology used in the disease expenditure project, may not always be accounted for in calculating direct health system expenditure on diabetes. For example, dialysis for end-stage renal disease, the most common cause of which is diabetes, may incur public hospital costs of an average \$67,000 per person treated over 1 year (average three separations per week at \$430 per separation (AIHW 2002)). The method used in the AIHW Disease Expenditure Database assigns all hospital separations (and thus hospital expenditure) for dialysis to the genitourinary category. Expenditure on out-of-hospital services, other medical services, pharmaceuticals and aged care relating to these associated conditions may also be considerable.

Although differences in diagnosis coding standards for diabetes mean that previously published diabetes expenditure data are not strictly comparable with the figures presented here, estimates for 1993–94 suggest that, when complications and associated diseases are accounted for, the total health system expenditure attributable to diabetes may be up to 80% higher than that estimated for diabetes alone (AIHW: Mathers & Penm 1999). Even taking into account the complications of diabetes that have already been included in the 2000–01 estimates, this suggests that the actual health system expenditure attributable to diabetes in 2000–01 is likely to have been more than \$1 billion.

These estimates of direct allocatable recurrent health system expenditure do not include all money spent on diabetes in Australia. There are many other factors which contribute to the total monetary cost of diabetes, or any disease. These include expenditure on conditions for which diabetes is a contributing cause (as described above), the cost of transport to and from medical appointments, aids and appliances used for self-management of diabetes, care of children or dependants while at appointments or in hospital, the cost to governments of pensions or allowances for unemployment or disability, and the cost of personal care assistance such as home nursing or meal supply. The non-monetary costs relating to diabetes are also substantial, and little information regarding these less tangible costs is available. Further work is required to estimate these components of the cost of diabetes in Australia. Given that Type 2 diabetes is a largely preventable condition, there is potential for substantial savings for governments, public and private companies, and individuals.

Glossary

additional diagnosis	Conditions or complaints either coexisting with the principal diagnosis or arising during the episode of care.
cardiovascular disease	Any disease of the heart or blood vessels, for example, heart attack, stroke, angina, or peripheral vascular disease.
dialysis	A method of removing excess waste substances from the blood when the kidneys are unable to work effectively.
endocrinologist	A doctor who treats people who have problems with their endocrine glands, such as diabetes.
glucose	A type of sugar the body uses for energy. The main source of glucose is carbohydrates in the diet.
glycosylated haemoglobin (HbA _{1C})	The concentration of glycosylated haemoglobin, or HbA _{1C} , indicates average blood sugar levels over the previous 3 to 4 months, and so provides a measure of long-term blood glucose control.
insulin	A hormone produced by the pancreas which helps the body to use glucose for energy.
insulin analogue	A substance which is similar to insulin and has the same effect as insulin in the body.
lipids	Fats found in the blood, such as cholesterol and triglycerides.
ophthalmologist	A health professional who treats people with eye problems or diseases.
podiatrist	A health professional who treats people with problems of the feet or lower limbs. Sometimes called a chiropodist.
principal diagnosis	The diagnosis established after study to be chiefly responsible for occasioning the patient's episode of care in hospital (or attendance at a health care facility).
separation	An episode of care in a hospital. This can refer to either the total stay (from admission to discharge, transfer, or death) or a portion of the total stay which ends in a change in the type of care (for example, moving from acute care to rehabilitation).

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References

- ABS (Australian Bureau of Statistics) 1997. 1995 National health survey: diabetes. ABS Cat. No. 4371.0. Canberra: ABS.
- ABS 2002. 2001 National health survey: summary of results. ABS Cat. No. 4364.0. Canberra: ABS.
- ABS 2004. Disability, ageing and carers: summary of findings, Australia 2003. ABS Cat. No. 4430.0. Canberra: ABS.
- AIHW (Australian Institute of Health and Welfare) 2002. Diabetes: Australian facts 2002. AIHW Cat. No. CVD 20. Canberra: AIHW (Diabetes Series No. 3).
- AIHW 2004a. Australian hospital statistics 2002–03. AIHW Cat. No. HSE 32. Canberra: AIHW (Health Services Series No. 22).
- AIHW 2004b. Health expenditure Australia 2002–03. AIHW Cat. No. HWE 27. Canberra: AIHW (Health and Welfare Expenditure Series No. 20).
- AIHW 2004c. Health system expenditure on disease and injury in Australia, 2000–01. AIHW Cat. No. HWE 26. Canberra: AIHW (Health and Welfare Expenditure Series No. 19).
- AIHW: Britt H, Miller GC, Knox S, Charles J, Valenti L, Henderson J et al. 2003. General practice activity in Australia 2002–03. AIHW Cat. No. GEP 14. Canberra: AIHW (General Practice Series No. 14).
- AIHW: Mathers C, Penm R, Carter R & Stevenson C 1998. Health system costs of diseases and injury in Australia 1993–94. AIHW Cat. No. HWE 5. Canberra: AIHW (Health and Welfare Expenditure Series No. 2).
- AIHW: Mathers C & Penm R 1999. Health system costs of cardiovascular diseases and diabetes in Australia 1993–94. AIHW Cat. No. HWE 11. Canberra: AIHW (Health and Welfare Expenditure Series No. 5).
- AIHW: Mathers C, Vos T & Stevenson C 1999. The burden of disease and injury in Australia. AIHW Cat. No. PHE 17. Canberra: AIHW.
- AIHW: Phillips G 2003. The impact of ICD coding changes for diabetes hospital morbidity data. AIHW Cat. No. CVD 26. Canberra: AIHW.
- Bruce DG, Casey GP, Grange V, Clarnette RC, Almeida OP, Foster JK et al. 2003. Cognitive impairment, physical disability and depressive symptoms in older diabetic patients: the Fremantle Cognition in Diabetes Study. *Diabetes Research and Clinical Practice* 61:59–67.
- Cameron FJ, Clarke C, Hesketh K, White EL, Boyce DF, Dalton VL et al. 2002. Regional and urban Victorian diabetic youth: clinical and quality-of-life outcomes. *Journal of Paediatrics and Child Health* 38:593–6.
- Colagiuri S, Colagiuri R, Conway B, Grainger D & Davey P 2003. DiabCost Australia: assessing the burden of Type 2 diabetes in Australia. Canberra: Diabetes Australia.
- DA & RACGP (Diabetes Australia & the Royal Australian College of General Practitioners) 2004. Diabetes management in general practice. Canberra: DA.

Davis TM, Clifford RM & Davis WA 2001. Effect of insulin therapy on quality of life in Type 2 diabetes mellitus: the Fremantle Diabetes Study. *Diabetes Research and Clinical Practice* 52:63–71.

DoHA (Department of Health and Ageing) 2003. Australian statistics on medicines 1999–00. Canberra: DoHA.

DoHA 2004. National Diabetes Services Scheme (NDSS). DoHA, Canberra. Viewed 11 August 2004, <<http://www.health.gov.au/pbs/healthpro/supply/ndss.htm>>.

Dunstan D, Zimmet P, Welborn T, de Courten M, Cameron A, Sicree R et al. 2002. The rising prevalence of diabetes and impaired glucose tolerance: the Australian diabetes, obesity and lifestyle study. *Diabetes Care* 25:829–34.

GPAC (General Practice Advisory Council) Queensland 2001. Management of diabetes mellitus in adults—the Queensland standard care pathway 2000. University of Queensland Mater Centre for General Practice, Brisbane. Viewed 6 September 2004, <<http://www.uq.edu.au/cgpmh/gp-paths/gp-22diabpath.htm>>.

NSW Health Department 1996. The principles of diabetes care and guidelines for the clinical management of diabetes mellitus in adults. Sydney: NSW Health Department.

Ramsey S, Summers KH, Leong SA, Birnbaum HG, Kemner JE & Greenberg P 2002. Productivity and medical costs of diabetes in a large employer population. *Diabetes Care* 25:23–29.

Wake M, Hesketh K & Cameron F 2000. The Child Health Questionnaire in children with diabetes: cross-sectional survey of parent and adolescent-reported functional health status. *Diabetic Medicine* 17:700–7.

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