Appendix B: Summary of disease costing methodology

The Disease Costs and Impact Study (DCIS) takes known aggregate expenditures on health care and apportions these to disease categories using Australian data (hospital morbidity data, case mix data, the national survey of morbidity and treatment in general practice, and the 1989–90 National Health Survey). The DCIS methodology is documented in detail in Mathers et al. (1998b).

Total recurrent health expenditure in 1993–94 is disaggregated by the following dimensions:

- Disease (defined by ICD-9 code groups—see Appendix A)
- Sector (hospital inpatient, non-inpatient, medical, pharmaceutical etc.)
- Program (treatment, prevention)
- Sex (male, female)
- Age (0–4, 5–14, 15–24, … 65–74, 75+).

The proportion of direct health expenditure included in the disease costings in this report represents 92% of direct health care expenditure (see Table B.2 for a list of the health sectors included). Recurrent expenditure on health care which has not yet been attributed includes:

- community health services;
- health promotion and illness prevention (apart from breast, cervix, lung and skin cancer public health programs);
- ambulance services;
- medical aids and appliances (with the exception of equipment and supplies for home blood glucose testing by diabetics).

The attribution of the direct costs of health services to disease is discussed in more detail below and summarised in Table B.2.

Hospital inpatient services

This sector includes inpatient (admitted patient) costs for recognised public hospitals (including public psychiatric hospitals), repatriation (veterans') hospitals and private hospitals. The proportions of total public acute hospital expenditure which relate to inpatients are given by the inpatient fractions estimated for each State and Territory by the National Health Ministers Benchmarking Working Group (1996).

Disease costs for inpatient services are estimated by apportioning the total inpatient expenditure for each State or Territory to individual episodes of hospitalisation with an adjustment for resource intensity of treatment for the specific episode (using Diagnostic Related Groups or DRGs). Medical costs for private, compensable and other non-public patients in public, repatriation and private hospitals are estimated using DRG-derived medical cost weights and age–sex specific information from the Health Insurance Commission on in-hospital private medical charges for various categories of service.

Public psychiatric hospital data for New South Wales and Victoria are used to allocate public psychiatric hospitals inpatient costs. These costs all fall in the mental health chapter of ICD-9.

Outpatient and casualty services

The 1989–90 ABS National Health Survey is used to allocate total expenditure on non-inpatient services for 1993–94. Total visits to outpatient clinics (including casualty or accident and emergency departments) for each age–sex–disease group are estimated from the National Health Survey data on numbers of outpatient visits in the two weeks prior to interview. Expenditure is allocated assuming that all visits have the same cost.

Nursing homes

The distribution of main disabling health condition of nursing home residents in the 1993 Australian Survey of Disability, Ageing and Carers is used to allocate total nursing home expenditure for 1993–94 to age–sex–disease categories at ICD-9 chapter level. This expenditure is apportioned to specific disease groups at the sub-chapter level according to the distribution of diagnosis for patients in that age–sex group who transfer from acute hospitals (around 60% of nursing home admissions).

Medical services

This sector includes expenditure on all private medical services apart from those to hospital inpatients. It includes consultations with general practitioners and specialists as well as pathology tests and screening and diagnostic imaging services. The 1990–91 Survey of Morbidity and Treatment in General Practice in Australia (GP survey) is used to allocate age–sex specific out-of-hospital expenditure on medical services to disease diagnoses. This allocation is done separately for general practitioners (based on encounters surveyed in the GP survey) and for 17 categories of specialists (based on the pattern of referrals to each category of specialist in the GP survey).

Age–sex specific out-of-hospital expenditure on medical services is derived from Medicare and Department of Veterans' Affairs (DVA) data. This expenditure covers all charges for which a Medicare or DVA claim has been made. It is adjusted to include expenditure for which claims have not been made using an inflation factor derived from the AIHW health expenditure data on total expenditure on medical services.

This methodology assumes that the pattern of GP services by diagnosis in 1993–94 is the same as that collected in 1990–91, that the pattern of diseases managed by each type of specialist in 1993–94 reflects the pattern of referrals to that specialist type from GPs in 1990–91 and that each referral to a specialist of a given type generates services with equal cost. Estimates of numbers of services and costs for pathology tests for high blood cholesterol were adjusted to reflect Medicare claims and total fees charged for 1993–94 for blood tests involving the measurement of high plasma cholesterol. The Medical Benefits Schedule includes five items of this type (see Table B.1), of which all but the first are multiple tests involving other blood plasma constituents. For the purposes of estimating the costs associated with testing for high cholesterol the fractions shown in the final column of Table B.1 were applied to the costs and numbers of services. Of the total $26.9 million

expenditure for these tests in 1993–94, an estimated $18.1 million was attributed to high blood cholesterol.

Table B.1: Pathology tests for plasma cholesterol/triglycerides: estimated costs and numbers of tests attributable to high blood cholesterol, 1993–94

Medical Benefits Schedule Item	No. of tests ('000)	Estimated fees charged ($'000)	Fraction attributed to high blood cholesterol
66331	1,019	18,400	1.00
66335	22	364	0.75
66337	33	483	0.75
66339	234	2,969	0.75
66341	431	4,705	0.50
Total	**1,740**	**26,922**	

Source: Medicare claims data provided by Commonwealth Department of Health and Family Services.

All other screening and diagnostic tests apart from the cholesterol tests shown in Table B.1 were costed based on the 1990–91 pattern of referrals by GPs using the overall average charge per pathology test in 1993–94.

Allied health services

The 1990–91 Survey of Morbidity and Treatment in General Practice in Australia and the 1989–90 ABS National Health Survey are used to allocate total Australian expenditure on allied health practitioners to age–sex–disease groups. Total visits to allied health practitioners in 1993–94 for each age–sex–disease group are estimated from the National Health Survey data on visits to 14 types of allied health practitioners in the two weeks prior to interview. Annual visits to other types of allied health practitioner are estimated from referrals by GPs in the GP survey. Expenditure is allocated assuming that all visits have the same cost. The methodology covers all allied health professionals except pharmacists (see below). Costs for dental services are allocated to the 'Digestive system' chapter of ICD-9 and account for the very large allied health expenditure for that chapter (see Table 1).

Pharmaceuticals

Total pharmaceutical expenditure is decomposed into two components: expenditures on prescription drugs and non-prescription (over-the-counter) pharmaceuticals. The 1990–91 Survey of Morbidity and Treatment in General Practice in Australia together with 1993–94 estimates of total costs and numbers of prescriptions for 40 categories of drug are used to allocate total Australian expenditure on prescription pharmaceuticals to age–sex–disease groups. Expenditure on over-the-counter pharmaceuticals is attributed to disease–age–sex groups using information from the 1989–90 ABS National Health Survey. The methodology addresses all pharmaceutical costs apart from the cost of pharmaceuticals dispensed in hospitals, which are included in estimates of hospital costs.

For each of 40 therapeutic drug groups (Pharmaceutical Benefits Pricing Authority 1994), the relative distribution of prescriptions by disease, age and sex for all community prescriptions in 1993–94 is assumed to be the same as that for prescriptions by general practitioners in 1990–91. For diseases where a significant proportion of prescriptions are made by medical

specialists, this assumption may have limited validity. Detailed estimates of 1993–94 utilisation and expenditure for the 40 drug categories are used as a starting point for attribution to disease–age–sex groups. This takes into account differences in average drug costs across therapeutic categories, average numbers of repeats and relative changes in utilisation and costs across drug categories between 1989–90 and 1993–94.

Public health programs

Community and public health programs in general are not yet included in the estimates of disease costs due to the difficulties in obtaining comprehensive case mix data for these health sectors. However, estimates of the costs for the breast and cervix cancer national screening programs, for skin cancer prevention programs, and for lung cancer's share of anti-smoking activities, have been included in the overall health system costs attributed to diseases and injury (Mathers et al. 1998a).

Research

Estimated total Australian expenditure on health and medical research for major disease and population groups in 1991 (Nicholl et al. 1994) was used to attribute 1993–94 total research spending to chapters of ICD-9. An analysis was carried out of the distribution of NHMRC grants for 1996 (NHMRC 1996) and these data were used to make preliminary estimates of the distribution of research funding across cardiovascular diseases, diabetes, and hypertension and high blood cholesterol. A more detailed analysis of NHMRC and ABS data on research expenditure is being undertaken by AIHW for future disease cost estimates.

Medical aids and appliances

The Disease Costs and Impact Study 1993–94 does not generally include expenditure for medical aids and appliances ($770 million in 1993–94) in the estimation of disease costs. There is significant expenditure on equipment and supplies for home blood glucose testing by diabetics and estimates of this expenditure have been included in the 'Other' category of costs for Type 1 and Type 2 diabetes in this report (see Appendix Table C.28).

The National Diabetic Supplies Scheme (NDSS) provides subsidised syringes, blood testing strips and reagents. It is administered by Diabetes Australia and funded by grant payments from the Commonwealth Department of Health and Family Services (Department of Health, Housing, Local Government and Community Services 1993) and by patient co-payments. Total expenditure for the NDSS in 1993–94 was $22.49 million (Diabetes Australia 1998). In the year to 30 June 1998, NDSS serviced 64% of the subsidised test strip market, the other 36% going through private pharmacies via the Pharmaceutical Benefits Scheme (PBS). Although total PBS and other pharmaceutical expenditure has been attributed to diseases including diabetes, the methods used did not apportion costs for blood testing strips. Taking into account pharmacy supply of test strips, the total cost of blood testing supplies has been estimated at $35.14 million in 1993–94.

The NDSS does not subsidise the purchase of blood glucose monitoring machines, nor does any other government funded program except DVA). Blood glucose monitoring machines sold in Australia are supplied by five manufacturers. Two of these manufacturers supplied data on total annual sales and costs of blood glucose monitoring machines in Australia. For

the 12 months from May 1997 to April 1998, there were 43,646 machines sold in Australia for a total cost of $4.4 million (or an average price of close to $100 per unit). Although annual sales of such machines have probably increased somewhat between 1993–94 and 1997–98, average prices have dropped. The approximate expenditure on blood glucose monitoring machines was estimated at $4.4 million for 1993–94.

Data from the NDSS suggests that close to 100% of Type 1 diabetics and around 50% of Type 2 diabetics monitor their blood glucose. Expenditure on monitoring machines was thus apportioned 20% to Type 1 and 80% to Type 2. It is likely that Type 2 diabetics do not monitor their blood glucose levels as often as Type 1 diabetics, so the expenditure on testing supplies was split 40% to Type 1 and 60% to Type 2 (a similar distribution to medical and pharmaceutical costs). Total estimated expenditure for blood glucose monitoring was apportioned to age–sex groups in proportion to total medical plus pharmaceutical costs.

Other institutional, non-institutional and administration expenditure

Other institutional health expenditure (the Red Cross Blood Transfusion Service), other non-institutional health expenditure (Family Planning Services) and administration expenditure (Commonwealth, State and Territory health authority administration expenses and management expenses of Medicare and registered private health insurance funds) are allocated to disease–sex–age groups in proportion to total health expenditure for other health sectors.

Table B.2: Summary of disease costing methodology, 1993–94

Health sector	Basis of cost attribution to disease–age–sex groups	Data sources
Hospitals		
Acute hospital inpatients Repatriation hospital inpatients	Separations weighted by DRG cost weight and length of stay.	AIHW National Hospital Morbidity Database 1993–94.
Public psychiatric hospital inpatients	Bed days.	AIHW National Hospital Morbidity Database 1993–94.
Hospital non-inpatients	At chapter level: number of visits in last 2 weeks. Sub-chapter level according to inpatient separations by site.	National Health Survey 1989–90. AIHW National Hospital Morbidity Database 1993–94.
Medical services		
In-hospital medical services for private, compensable and other patients	Separations weighted by DRG-based estimated medical service cost weights.	Medicare data on fees charged for eligible in-hospital medical services in 1993–94. AIHW National Hospital Morbidity Database 1993–94.
Out-of-hospital medical services	GP encounters weighted by Medicare data on fees charged. Specialist referrals by GPs, weighted by Medicare data on fees charged.	Medicare data on fees charged for eligible out-of-hospital medical services in 1993–94. Australian Survey of Morbidity and Treatment in General Practice 1990–91.
Pharmaceuticals		
Prescription drugs	Prescriptions weighted by relative utilisation and average prescription cost for therapeutic drug group.	Pharmaceutical Benefits Scheme utilisation and cost data for 1993–94. Australian Survey of Morbidity and Treatment in General Practice 1990–91.
Over-the-counter medicines	Use of non-prescription medications in the last 2 weeks.	National Health Survey 1989–90.
Allied health services	Reported visits in the last 2 weeks together with referrals by GPs.	National Health Survey 1989–90. Australian Survey of Morbidity and Treatment in General Practice 1990–91.
Nursing homes	For ICD-9 chapters: number of residents by main disabling condition. Attribution to sub-chapter level on basis of distribution of transfers from acute hospitals.	Survey of Disability, Ageing and Carers 1993. AIHW National Hospital Morbidity Database 1993–94.
Other		
Public health	Estimated costs for breast, cervix, lung and skin cancer prevention programs. Costs of other public health programs not included as yet.	Refer to Mathers et al. (1998b) for details of cancer prevention program costing.
Research	Estimated expenditure for major disease groups from Nicholl et al. Distributed to detailed disease groups in proportion to NHMRC and other relevant grant distributions.	Nicholl et al. (1994). NHMRC (1996).
Medical aids and appliances	Estimated costs of home glucose testing equipment distributed in proportion to medical plus pharmaceutical costs.	Diabetes Australia (1998).
Other institutional (nec), Administration and Other non-institutional	Allocated to disease–age–sex groups in proportion to total expenditure in other categories.	n.a.

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