

**National Centre for Epidemiology and Population Health  
The Australian National University**

## **Estimating disease-specific costs of GP services in Australia**

**James R G Butler, PhD  
Senior Fellow (Health Economics) & Deputy Director  
National Centre for Epidemiology and Population Health  
The Australian National University**

**Helena Britt, PhD  
Associate Professor & Director  
Family Medicine Research Centre  
The University of Sydney**

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***ADDRESS FOR CORRESPONDENCE:***

**NATIONAL CENTRE FOR EPIDEMIOLOGY AND POPULATION HEALTH  
THE AUSTRALIAN NATIONAL UNIVERSITY  
CANBERRA AUSTRALIA ACT 0200**

**PHONE: 61 2 6125 2378  
FAX: 61 2 6125 0740  
E-mail: [Jim.Butler@anu.edu.au](mailto:Jim.Butler@anu.edu.au)**

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James R G Butler  
Helena Britt

Phone: 02 6125-2378  
Fax: 02 6125-0740  
E-mail: [Jim.Butler@anu.edu.au](mailto:Jim.Butler@anu.edu.au)

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## 1. Introduction

The primary purpose of this paper is to develop estimates of the costs of management by general practitioners (GPs) of specific diseases. The motivation for the project arises from a dearth of knowledge about the costs of GP management of various conditions on a disease-specific basis. In Australia, aggregate data on the Medicare benefits paid for "GP attendances" are provided in the statistical tables accompanying the annual reports of the Health Insurance Commission (e.g. Health Insurance Commission 2000), but these data do not report the total fees charged by GPs and are not available on a disease-specific basis.

The present study uses data available from a nationally representative sample of GPs - the Australian Morbidity and Treatment Survey (AMTS) - combined with information provided by the (then) Commonwealth Department of Human Services and Health and the Department of Veterans' Affairs, to estimate disease-specific costs of GP services. The AMTS, undertaken by the (then) Family Medicine Research Unit at the University of Sydney over the twelve month period from October 1990 to September 1991, contains data on the problems managed at GP encounters (up to four per encounter), the medications prescribed and treatments provided for each of those problems, and the pathology, radiology and other tests ordered at each encounter. A (single) Medicare item number was also recorded for each encounter (Bridges-Webb *et al.* 1992). These data can be used, in conjunction with data on the average price charged by item number supplied by the two Commonwealth Departments just mentioned, to investigate the costs of management by GPs of specific conditions.

The data sources used in this study are subject to a number of limitations, perhaps the most important of which is that the AMTS data are not longitudinal data on individual patients. The unit record in the AMTS data is the GP encounter with no tracking of patients through time. Thus it is not possible to obtain any estimates of the costs of GP management on a patient or episode-of-illness basis.

## 2. Estimating the costs of encounters

The AMTS contains a sample of 113,468 encounters with general practitioners. When these encounters are weighted to allow for over-sampling in some States/Territories, the weighted total number of encounters is 98,796.

The AMTS information allows six cost components to be identified for each encounter/problem managed:

- ◆ Identified Medicare Benefit Schedule (MBS) item number<sup>1</sup>
- ◆ Pathology ordered
- ◆ Imaging ordered
- ◆ Other tests and investigations
- ◆ Medications

---

<sup>1</sup> This is the only MBS item number recorded on the AMTS form and hence is referred to in this paper as the 'identified' item number. MBS items have been assigned to other cost components as part of this research project but are not identifiable from the AMTS data as such.

#### ◆ Non-pharmacological treatments

Of these, only two – medications and other treatments – are specifically related to a diagnosis/problem on the survey instrument.

The estimation of costs for each of these six cost categories will be discussed in turn.

#### 2.1 *Cost of identified MBS item numbers*

The survey form allowed for the recording of one MBS item number for each encounter. The descriptions of the MBS item numbers recorded, together with their absolute and relative frequencies, are shown in Table 1. As expected, by far the most common MBS items recorded were items 23 and 53 (the level B/standard consultation items for vocationally registered and non-vocationally registered GPs respectively). Together, these accounted for 81.2% of all MBS items numbers recorded.

Item numbers 0, 336, 1000, 9800, 9803 and 9901, which were recorded at a total of 2,515 encounters, are invalid MBS item numbers. Item numbers 8995, 8996, 8997 and 8998, which were recorded at a total of 1,357 encounters, are non-MBS item numbers used in the survey to code particular encounters for which no MBS item numbers are applicable.

To estimate the cost of this component of the encounter, each encounter with a valid MBS item number (109,596 encounters) was assigned a cost for the MBS item equal to the average price charged for that item in the data provided by the Commonwealth Department of Human Services and Health and the DVA. For the 3,872 encounters with invalid MBS item numbers, the cost was taken as the weighted average price charged at the 109,596 encounters for which valid MBS item numbers were recorded (\$22.22).

On this basis, the cost of the recorded items for the 113,468 encounters was \$2,520,983.

#### 2.2 *Pathology, Imaging, and Other tests*

The survey allowed the identification of only six broad types of pathology test: blood, urine, culture, Pap smear, Other tissue, and Other (see Appendix 1). For each of these broad categories, a set of MBS item numbers was identified and the weighted average price charged for all tests in the category was calculated. Imputing these average prices charged to pathology ordered at each encounter resulted in an estimated total cost of pathology for the sample encounters of \$395,146.

The same approach was used for the Imaging category, where only four types of x-ray were identified in the survey (Plain, Contrast/special, Ultrasound, and Other). The estimated total cost of x-rays in the sample encounters was \$578,276.

The 'Other' category comprised four broad types of tests: E.C.G., Spirometry, Multiphasic screening, and Other. Using the same methods as for Pathology and Imaging, the total cost of these other tests in the sample encounters was \$39,302.

An important limitation of the survey data on pathology, x-rays and other tests is that the survey form did not link these tests to any particular problem managed. Hence, it was not possible to

**TABLE 1**  
**ABSOLUTE AND RELATIVE FREQUENCIES OF MBS ITEM NUMBERS RECORDED AT ENCOUNTERS**  
**IN THE AUSTRALIAN MORBIDITY AND TREATMENT SURVEY**

Item No.	Frequency		Brief Description
	No.	%	
0	2,477	2.18	Missing or no charge
<i>Attendances by vocationally registered general practitioners (VRGPs)</i>			
3	2,124	1.87	Surgery consultation - level A
4	55	0.05	Home visit - level A
23	56,317	49.63	Surgery consultation - level B
24	2,518	2.22	Home visit - level B
36	4,002	3.53	Surgery consultation - level C
37	233	0.21	Home visit - level C
44	272	0.24	Surgery consultation - level D
47	39	0.03	Home visit - level D
<i>Attendances by other than vocationally registered general practitioners (non-VRGPs)</i>			
52	1,254	1.11	Brief consultation (less than 5 minutes)
53	35,851	31.60	Standard consultation (more than 5 but not more than 25 minutes)
54	1,419	1.25	Long consultation (more than 25 but not more than 45 minutes)
57	195	0.17	Prolonged consultation (more than 45 minutes)
58	14	0.01	Brief home visit
59	1,660	1.46	Standard home visit
60	81	0.07	Long home visit
65	14	0.01	Prolonged home visit
66	2	0.00	Brief consultation at an institution
69	24	0.02	Standard consultation at an institution
80	368	0.32	Emergency attendance after hours at a place other than surgery
82	10	0.01	Examination of a patient in preparation for an anaesthetic
98	175	0.15	Emergency attendance after hours at consulting rooms
160	3	0.00	Prolonged professional attendance (not less than one but less than two hours)
162	2	0.00	Prolonged professional attendance (not less than three but less than four hours)
170	5	0.00	Professional attendance for group therapy (two patients)
171	4	0.00	Professional attendance for group therapy (three patients)
172	1	0.00	Professional attendance for group therapy (four or more patients)
<i>Obstetrics</i>			
190	831	0.73	Antenatal care (where total attendances do not exceed ten) - each attendance
192	45	0.04	Antenatal care (where total attendances exceed ten)
194	2	0.00	Confinement and postnatal care (where the practitioner has not given the antenatal care) (G)
196	2	0.00	Confinement and postnatal care (where the practitioner has not given the antenatal care) (S)
198	2	0.00	Confinement as an independent procedure by a specialist
204	49	0.04	Antenatal care, confinement and postnatal care for nine days (G)
205	2	0.00	Antenatal care, confinement and postnatal care for nine days (S)
248	1	0.00	Pregnancy complications (non-routine antenatal attendance)
250	1	0.00	Purse string ligation of cervix for threatened miscarriage
267	1	0.00	Removal of purse string ligature of cervix under general anaesthesia
336	1	0.00	Invalid item number
<i>Regional or field nerve block</i>			
748	4	0.00	Regional or field nerve block
753	1	0.00	Introduction at the end of an operation of a local anaesthetic
<i>Miscellaneous procedures</i>			
780	1	0.00	Urine flow study
791	7	0.01	Ultrasonic cross-section echography
818	1	0.00	Brain stem evoked response audiometry
863	2	0.00	Audiogram, air conduction
877	2	0.00	Impedance audiogram
908	25	0.02	Twelve-lead electrocardiography, tracing and report
909	1	0.00	Twelve-lead electrocardiography, report only or tracing only
915	2	0.00	Continuous ECG monitoring
916	25	0.02	Electrocardiographic monitoring
920	2	0.00	Measurement of the mechanical or gas exchange function of the respiratory system
921	19	0.02	Measurement of respiratory function
923	1	0.00	Whole body perfusion, cardiac by-pass
953	1	0.00	Right heart balloon flotation
960	2	0.00	Hormone or living tissue implantation by incision
963	3	0.00	Hormone or living tissue implantation by cannula
980	629	0.55	Attendance at which acupuncture is performed

Item No.	Frequency		Brief Description
	No.	%	
987	2	0.00	Skin sensitivity testing for allergens
993	1	0.00	Duplex scanning
1000	33	0.03	Invalid item number
<i>Radiology</i>			
2508	5	0.00	Hand, wrist, forearm, elbow or arm
2524	3	0.00	Foot, ankle, lower leg, upper leg, knee or thigh
2543	1	0.00	Clavicle
2678	1	0.00	Intravenous pyelography
<i>Assistance at operations</i>			
2953	1	0.00	Assistance at an operation for which the fee exceeds \$285
<i>Operations</i>			
3006	21	0.02	Dressing of localised burns
3012	3	0.00	Dressing of burns, extensive
3038	1	0.00	Excision of burns under general anaesthesia
3046	133	0.12	Repair of recent wound of skin or subcutaneous tissue, other than on face or neck, superficial
3050	30	0.03	As for 3046 but involving deeper tissue
3058	46	0.04	Repair of recent wound of skin or subcutaneous tissue, on face or neck, superficial
3063	10	0.01	As for 3058 but involving deeper tissue
3073	8	0.01	Repair of skin and subcutaneous tissue or mucous membrane, other than on face or neck, superficial
3082	10	0.01	As for 3073 but involving deeper tissue
3098	3	0.00	As for 3073 but on face or neck, involving deeper tissue
3113	8	0.01	Removal of superficial foreign body
3116	13	0.01	Removal of subcutaneous foreign body requiring incision and suture
3130	12	0.01	Biopsy of skin or mucous membrane as an independent procedure
3219	502	0.44	Removal of tumour, cyst, ulcer or scar up to 3cm in diameter, by surgical excision or suture
3221	8	0.01	As for 3219 on more than 3 but not more than 10 lesions
3223	2	0.00	As for 3219 on more than 10 but not more than 20 lesions
3233	20	0.02	Removal of tumour, cyst, ulcer or scar up to 3cm in diameter
3247	1	0.00	Removal of tumour or cyst, not covered by any other item
3261	1	0.00	Removal of tumour or deep cyst requiring wide excision
3271	3	0.00	Removal of malignant tumour from skin, requiring deep and wide excision, excl. basal cell carcinoma
3320	21	0.02	Removal of plantar wart
3348	41	0.04	Removal of warts requiring admission to hospital or approved day hospital facility
3349	60	0.05	Treatment of cutaneous neoplastic lesions
3350	42	0.04	Removal of cancer of skin or mucous membrane
3351	11	0.01	As for 3350, more than 3 but not more than 10 lesions
3352	1	0.00	As for 3350, more than 10 lesions
3356	1	0.00	Multiple injections of skin lesions with hydrocortisone or similar preparations
3366	2	0.00	Aspiration of haematoma
3371	35	0.03	Incision with drainage of haematoma, furuncle, small abscess or similar lesion
4074	1	0.00	Appendectomy
4197	1	0.00	Paracentesis abdominis
4222	1	0.00	Repair of femoral or inguinal hernia
4265	3	0.00	Tapping of hydrocele
4319	5	0.00	Circumcision of person under six months of age
4354	8	0.01	Examination with rigid sigmoidoscope, with or without biopsy
4383	1	0.00	Flexible fiberoptic sigmoidoscopy or fiberoptic colonoscopy, with or without biopsy
4386	1	0.00	As for 4383 with removal of one or more polyps
4455	1	0.00	Dilatation of anus under general anaesthesia
4509	11	0.01	Rubber band ligation of haemorrhoids
4611	1	0.00	Excision of pilonidal sinus or cyst in a person ten years of age or older
4630	2	0.00	Subcutaneous diathermy or sclerosant injection of talangiectases or starburst vessels
5059	2	0.00	Removal of foreign body in ear, otherwise than by simple syringing
5201	1	0.00	Removal of foreign body in nose, other than by simple probing
5229	1	0.00	Cauterisation or diathermy of septum, turbinates or pharynx
5840	1	0.00	Catherisation of bladder where no other procedure is performed
6036	2	0.00	Passage of urethral sounds as an independent procedure
6039	1	0.00	Dilatation of urethral stricture
6053	1	0.00	Urethroscopy with any one or more of biopsy, diathermy or removal of foreign body or stone
6249	5	0.00	Vasotomy or vasectomy, unilateral or bilateral
6262	10	0.01	Introduction of intrauterine contraceptive device
6411	3	0.00	Cauterisation, ionisation, diathermy or biopsy of cervix
6413	2	0.00	Removal of polyp or polypi from cervix, with or without dilatation
6460	1	0.00	Curettage of uterus, with or without dilatation
6754	3	0.00	Extirpation of tarsal cyst
6818	40	0.04	Removal of imbedded foreign body from cornea or sclera



Item No.	Frequency		Brief Description
	No.	%	
6837	1	0.00	Removal of pterygium
6953	1	0.00	Insertion of intercostal drain, not involving resection of rib
7419	1	0.00	Treatment of third or subsequent dislocation of shoulder, not requiring anaesthetic
7423	1	0.00	Treatment of dislocation of elbow
7505	2	0.00	Treatment of fractures - terminal phalanx of finger or thumb
7520	6	0.01	Treatment of fractures - one or more metacarpals
7533	1	0.00	Treatment of fractures - carpus excl. navicular
7535	2	0.00	Treatment of fractures - navicular or carpal scaphoid
7540	10	0.01	Treatment of fractures - wrist
7547	4	0.00	Treatment of fractures - distal end of radius or ulna, involving wrist
7550	8	0.01	Treatment of fractures - radius
7559	1	0.00	Treatment of fractures - ulna
7567	4	0.00	Treatment of fractures - humerus or both shafts of forearm
7588	4	0.00	Treatment of fractures - clavicle or sternum
7597	1	0.00	Treatment of fractures - scapula
7632	1	0.00	Treatment of fractures - fibula or tarsus
7641	1	0.00	Treatment of fractures - tibia or patella
7647	4	0.00	Treatment of fractures - ankle with or without dislocation
7673	3	0.00	Treatment of fractures - metatarsals
7681	1	0.00	Treatment of fractures - phalanx of toe (other than great toe)
7687	1	0.00	Treatment of fractures - distal phalanx of great toe
7861	10	0.01	Removal of digital nail
7864	1	0.00	Incision for pulp space infection, paronychia or other acute infection of hands or feet
7874	7	0.01	Excision or wedge resection of nail bed
8023	1	0.00	Prosthetic replacement of finger joint
8105	35	0.03	Aspiration of, or injection into, joint or other synovial cavity
8219	1	0.00	Primary suture of flexor tendon of hand
8448	1	0.00	Single stage local muscle flap repair
8480	2	0.00	Single stage local flap repair, excl. flap for male pattern baldness
8518	1	0.00	Free full thickness grafts, excl. grafts for male pattern baldness
8588	1	0.00	Correction of ectropion or entropion
<i>AMTS non-Medicare item number codes</i>			
8995	650	0.57	Home visit NOS
8996	269	0.24	Surgery consult NOS
8997	264	0.23	Workers' compensation (specified)
8998	174	0.15	Paid by external body (not hospital/state)
<i>Other</i>			
9800	2	0.00	After Hours attendance
9803	1	0.00	Invalid item number
9901	1	0.00	Invalid item number
<b>Totals</b>	<b>113,468</b>	<b>100</b>	
<b>Note: (G) = general practitioner fee, (S) = specialist fee</b>			

ascribe these costs unambiguously to specific diseases when two or more problems were managed at the one encounter.

### *2.3 Medications*

The survey allowed the recording of up to four medications prescribed or directly supplied by the GP for each problem managed at each encounter. As such, the data allow the medications prescribed to be linked to the problem managed. However, no details on the formulation, pack size or number of repeats authorised were recorded. The cost of medications prescribed at each encounter was therefore estimated using various sources. Where data on the number of scripts prescribed by formulation were included in Australian Statistics on Medicines, the weighted average cost from these data was used (Department of Health, Housing and Community Services 1992). Where such data were not available, either a simple average of the maximum price for dispensed quantity for each formulation from the Pharmaceutical Benefits Scheme (PBS) schedule (Department of Health, Housing and Community Services 1991) or an over-the-counter price was used.

The total cost of medications prescribed or supplied for the sample encounters was then estimated to be \$1,491,778. It should be noted that this estimate makes no allowance for the cost of repeat prescriptions as information on the number of repeats was not available from the AMTS data.

### *2.4 Other (non-pharmacological) treatments*

The survey data contain a number of treatment codes that provide additional information on the therapy provided at an encounter. These include treatments and procedures such as 'close laceration', 'aspirate joint' and 'circumcision'. As with the medication codes, the treatment codes are assigned to specific problems managed.

Around half of the treatments were found not to attract any additional rebates under the MBS scheme, i.e. the remuneration for the treatment provided would have been included in the attendance fee captured under the identified MBS item. For the remaining treatments, one or more MBS item numbers were assigned and the average fee charged for that item or collection of items was imputed as the cost of the treatment provided.

On this basis, the total cost of non-pharmacological treatments provided at the sample encounters was estimated to be \$149,064.

## **3. Costs of encounters by cost component**

The estimated costs of identified MBS items, pathology, imaging, other tests and investigations, medications and treatments are shown in Table 2. Overall, the health care costs associated with this sample of GP encounters amount to \$5,174,549 or \$45.60 per encounter. Nearly half of these costs are accounted for by the identified MBS items (predominantly the consultation cost), while another 29% are accounted for by prescribed medications. Pathology, imaging and other tests and investigations account for about 20%. The remainder (2-3%) is accounted for by other treatments. In short, the costs of 'flow on' services associated with GP encounters exceed the

consultation cost, with the result that the overall health care cost of the encounter is more than double the consultation cost.

**TABLE 2**  
**ESTIMATED TOTAL COSTS OF IDENTIFIED MBS ITEMS, PATHOLOGY, IMAGING, OTHER TESTS AND INVESTIGATIONS, MEDICATIONS AND TREATMENTS PROVIDED TO SAMPLE ENCOUNTERS IN THE AUSTRALIAN MORBIDITY AND TREATMENT SURVEY**  
**(n = 113,468)**

Cost component	Total cost		Average cost per encounter (\$)
	Amount (\$)	% of total	
Identified MBS items	2,520,983	48.7	22.22
Pathology	395,146	7.6	3.48
Imaging	578,276	11.2	5.10
Other tests & investigations	39,302	0.8	0.35
Medications	1,491,778	28.8	13.15
Treatments	149,064	2.9	1.31
<b>TOTAL</b>	<b>5,174,549</b>	<b>100.0</b>	<b>45.60</b>

**Note:** Any discrepancies between totals and sums of components are due to rounding. Dollar amounts are expressed in Australian dollars in 1992 prices.

#### 4. Costs of encounters – national estimates

To obtain national estimates of the cost of GP services over the sample period (1 October 1990 to 30 September 1991), a sampling fraction was needed. In calculating this sampling fraction, it was necessary to use the weighted number of encounters in the AMTS as these had been adjusted for the over-sampling that took place in smaller States and Territories (see Bridges-Webb *et al* 1992, Table 3.3, for the weights).

The total number of GP encounters in the AMTS was 113,468 of which 109,596 had valid Medicare item numbers. The corresponding weighted totals were 98,796.2 and 94,764.96. In the Medicare/DVA data over the same period, the total number of services provided for the item numbers that were recorded in the AMTS was 85,990,215. The sampling fraction in the AMTS was therefore taken as  $94,764.96/85,990,215$  or 0.00110204. The inverse of this sampling fraction (907.4052) was then used to scale up the sample estimates of the (weighted) number of encounters to national estimates.

The resulting national estimates of the cost of GP encounters are shown in Table 3. Overall, the estimated national cost in 1990-91 was \$4,101.0 million. As these estimates are scaled up from the sample estimates, the percentage composition of these costs by cost component is the same as in Table 2.

**TABLE 3**  
**ESTIMATED TOTAL COSTS OF IDENTIFIED MBS ITEMS, PATHOLOGY, IMAGING,**  
**OTHER TESTS AND INVESTIGATIONS, MEDICATIONS AND TREATMENTS**  
**PROVIDED TO AUSTRALIAN POPULATION, 1991-92**  
**(Australian dollars, 1992 prices)**

Cost component	Total cost	Cost per capita		
		Male	Female	Total
Identified MBS items	1,993,097,681	94.47	133.49	114.06
Pathology	312,628,312	12.63	23.11	17.89
Imaging	458,371,558	18.45	33.95	26.23
Other tests & investigations	31,409,898	1.82	1.78	1.80
Medications	1,187,044,972	58.12	77.66	67.93
Treatments	118,450,933	6.99	6.57	6.78
<b>TOTAL</b>	<b>4,101,003,355</b>	<b>192.47</b>	<b>276.56</b>	<b>234.69</b>

**Note:** Any discrepancies between totals and sums of components are due to rounding.

## 5. Costs of encounters by age and sex

Table 3 also shows the estimated national costs expressed in per capita terms, by sex. Overall, the estimated national cost translates into a cost per capita of \$234.69, but the cost per capita differs substantially between males (\$192.47) and females (\$276.56). This lower cost of services for males is reflected in four of the six cost components, as is also evident in Figure 1.

Is the lower cost per capita for males due to their visiting GPs less often, or having lower costs per encounter each time they see a GP? Table 4 shows a disaggregation of the estimated cost per capita by the number of encounters per capita and the cost per encounter. Clearly, males visited GPs considerably less frequently than females (4.33 *vs* 5.93 visits per capita per year), and it is this that accounted for most of the lower per capita cost of GP services for men. The cost per encounter for males was only marginally lower than for females (\$44.48 *vs* \$46.66).

**TABLE 4**  
**NUMBER OF ENCOUNTERS PER CAPITA AND COST PER ENCOUNTER BY SEX**

	Encounters per capita (1)	Cost per encounter (2)	Cost per capita (3) = (1) x (2)
Males	4.33	\$44.48	\$192.47
Females	5.93	\$46.66	\$276.56
Total	5.13	\$45.60	\$234.69

**Note:** Any discrepancies between 'cost per capita' and the product of 'encounters per capita' and 'cost per encounter' are due to rounding.

**Source:** AMTS data, cost estimates and ABS population estimates as at 30 June 1992.

**FIGURE 1**  
**ESTIMATED PER CAPITA COST OF GENERAL PRACTITIONER ENCOUNTERS BY SEX AND COST COMPONENT**  
 (Australian dollars, 1992 prices)



The lower per capita cost of GP encounters for males was also evident throughout most of the age range (see Figure 2). While per capita costs were very similar from birth up to and including the 10-14 age group, they were much higher for females thereafter with the exception of the 85+ age group.<sup>2</sup>

## 6. Disease-specific costs of GP services

### 6.1 Data

In the AMTS, diagnoses were coded using the International Classification of Primary Care (ICPC) (Lamberts and Wood 1987). ICPC has a biaxial structure with 17 chapters on one axis (each of which has an alphabetic code) and seven components on the other (each of which has a two-digit numeric code range). The general structure of the classification system is shown in Figure 3.

FIGURE 3  
THE INTERNATIONAL CLASSIFICATION OF PRIMARY CARE (ICPC)

Components	Chapters																
	A	B	D	F	H	K	L	N	P	R	S	T	U	W	X	Y	Z
1. Symptoms, complaints																	
2. Diagnostic, screening, prevention																	
3. Treatment, procedures, medication																	
4. Test results																	
5. Administrative																	
6. Other																	
7 Diagnoses, disease																	

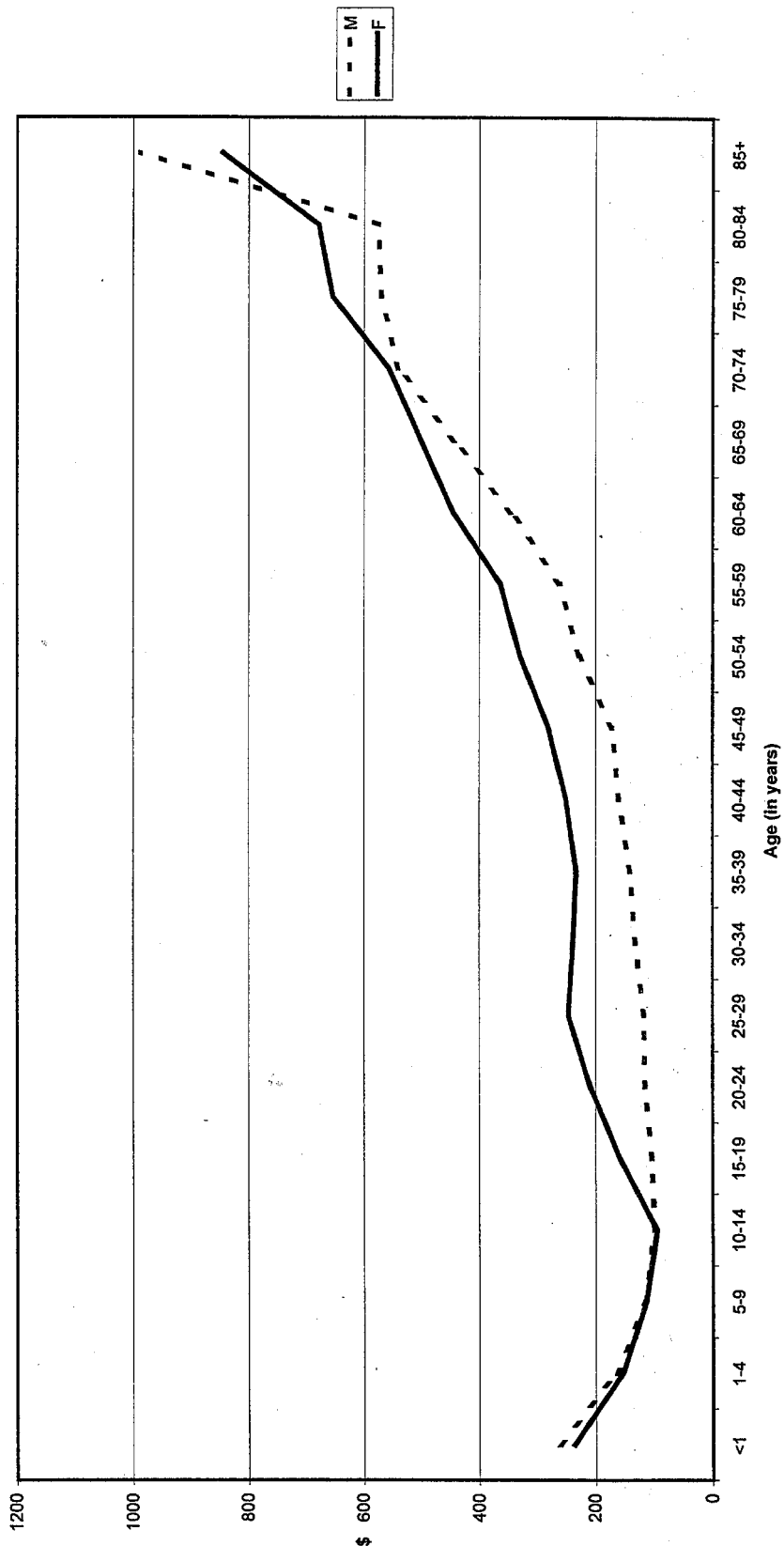
A General	L Musculoskeletal	U Urinary
B Blood, blood forming	N Neurological	W Pregnancy, family planning
D Digestive	P Psychological	X Female genital
F Eye	R Respiratory	Y Male genital
H Ear	S Skin	Z Social
K Circulatory	T Metabolic, endocrine, nutrition	

The AMTS allowed for up to four problems managed at an encounter to be recorded on the survey instrument. Subsequently, each of these problems managed was assigned an ICPC code of the form 'A05', 'Z65' and so on. A full list of ICPC codes and descriptors is available for download from:

<http://nceph.anu.edu.au/> (follow links to Publications/Working Papers)

<sup>2</sup> A breakdown of the costs of GP encounters by age, sex and cost category is provided in Appendix 2.

**FIGURE 2**  
**ESTIMATED PER CAPITA COST OF GENERAL PRACTITIONER ENCOUNTERS BY SEX AND AGE**  
 (Australian dollars, 1992 prices)



In total, 988 ICPC codes were used in coding the 167,004 problems managed at the 113,468 encounters in the survey. The breakdown of the number of single, 2-, 3- and 4-problem encounters by number of encounters and number of problems managed is as follows:

<i>Number of problems managed at encounter</i>	<i>Number of encounters</i>	<i>Number of problems managed</i>
1	73,051	73,051
2	29,458	58,916
3	8,799	26,397
4	2,160	8,640
<b>Total</b>	<b>113,468</b>	<b>167,004</b>

A number of multi-problem encounters were found to have the same ICPC codes recorded in two or more diagnosis fields. These do not necessarily reflect errors in coding, for a person may have several diseases, both of which are classified in the same ICPC code and rubric (e.g. in other diseases of the circulatory system). However they do create difficulties in constructing diagnosis-specific cost estimates and they were therefore removed from the data. This left a total of 166,829 problems managed in the data set used for the disease-specific cost estimates.

The survey information allowed six cost components to be identified for each encounter/problem managed, as discussed earlier in this paper:

- ◆ Identified MBS item numbers.
- ◆ Pathology ordered
- ◆ Imaging ordered
- ◆ Other tests and investigations
- ◆ Medications prescribed or supplied
- ◆ Other non-pharmacological treatments

Of these, only two – medications and other treatments – are specifically related to a diagnosis/problem on the survey instrument. Of course, for a single problem encounter, the remaining four cost components can all be considered unambiguously as part of the cost of managing that problem at the encounter. But for multi-problem encounters, the first four cost components cannot unambiguously be assigned to any particular problem managed. This gives rise to some issues of method when constructing disease-specific estimates of the costs of GP services based on the AMTS data.

## 6.2 Methods

Any attempt to allocate costs of individual problems managed using the AMTS data must confront the issue that, apart from the costs of medications and other treatments, costs cannot be allocated uniquely to the problem that caused their incurrence. For any GP encounter, the cost of the consultation, pathology tests, imaging, and other tests usually cannot be assigned to one specific problem managed (unless, of course, only one problem was managed at the encounter). In contrast, medications, particularly prescription medications, are usually provided for the management of a specific indication, as are other treatments.



In this report, the unassignable costs of multi-problem encounters have been added into the costs of encounters for each problem managed at the encounter. For example, suppose that two problems were managed at an encounter, with the diagnosis codes for the problems managed being A03 and Z06. In reporting the results on the costs of encounters at which A03 was a problem managed, the unassignable costs of this encounter are included. But they are also included in the costs of encounters at which Z06 was a problem managed. The estimates of total costs obtained in this way provide answers to questions of the following form: What is the total cost of encounters at which problem X00 was managed, excluding any assignable costs (costs of medications and other treatments) for other problems managed at the encounter?

It will be immediately evident that the sum of the total costs for each problem managed so calculated will exceed somewhat the total cost of the sample encounters reported earlier in this report (\$5,174,549). Indeed, the total costs obtained through summation of the disease-specific costs amount to \$7,048,493. This is due to the double, triple and quadruple inclusion of unassignable costs for two, three and four problem encounters respectively. For this reason, the sum of the total costs for each diagnosis code in the results on disease-specific costs provide no meaningful measure of the total costs of the 113,468 encounters in the survey.

Another complication is introduced when calculating the average cost per encounter at which a particular problem is managed. Consider again the example of a two-problem encounter with diagnosis codes A03 and Z06. In the disease-specific results, where the number of encounters involving each diagnosis needs to be known, such an encounter would be counted twice – once as an encounter involving A03 and once as an encounter involving Z06. In other words, the number of encounters for two, three and four problem encounters are double, triple and quadrupled counted. This leads to a total number of encounters in the disease-specific results of 166,829 (which is equal to the number of problems managed). As a result, when the total cost obtained by summing the disease-specific total cost for each diagnosis is divided by this total number of encounters, the average cost per encounter is \$42.25 ( $= \$7,048,793/166,829$ ). This is less than the 'true' average cost per encounter of \$45.60 reported earlier in this paper.

### 6.3 Results

Results are available for all 988 diagnoses recorded in the AMTS, with breakdowns by the number of problems managed at the encounter for each diagnosis, and by cost component (Identified MBS item numbers, Pathology, etc.). The full set of results is too voluminous to report here but can be obtained in Excel workbook format by download from:

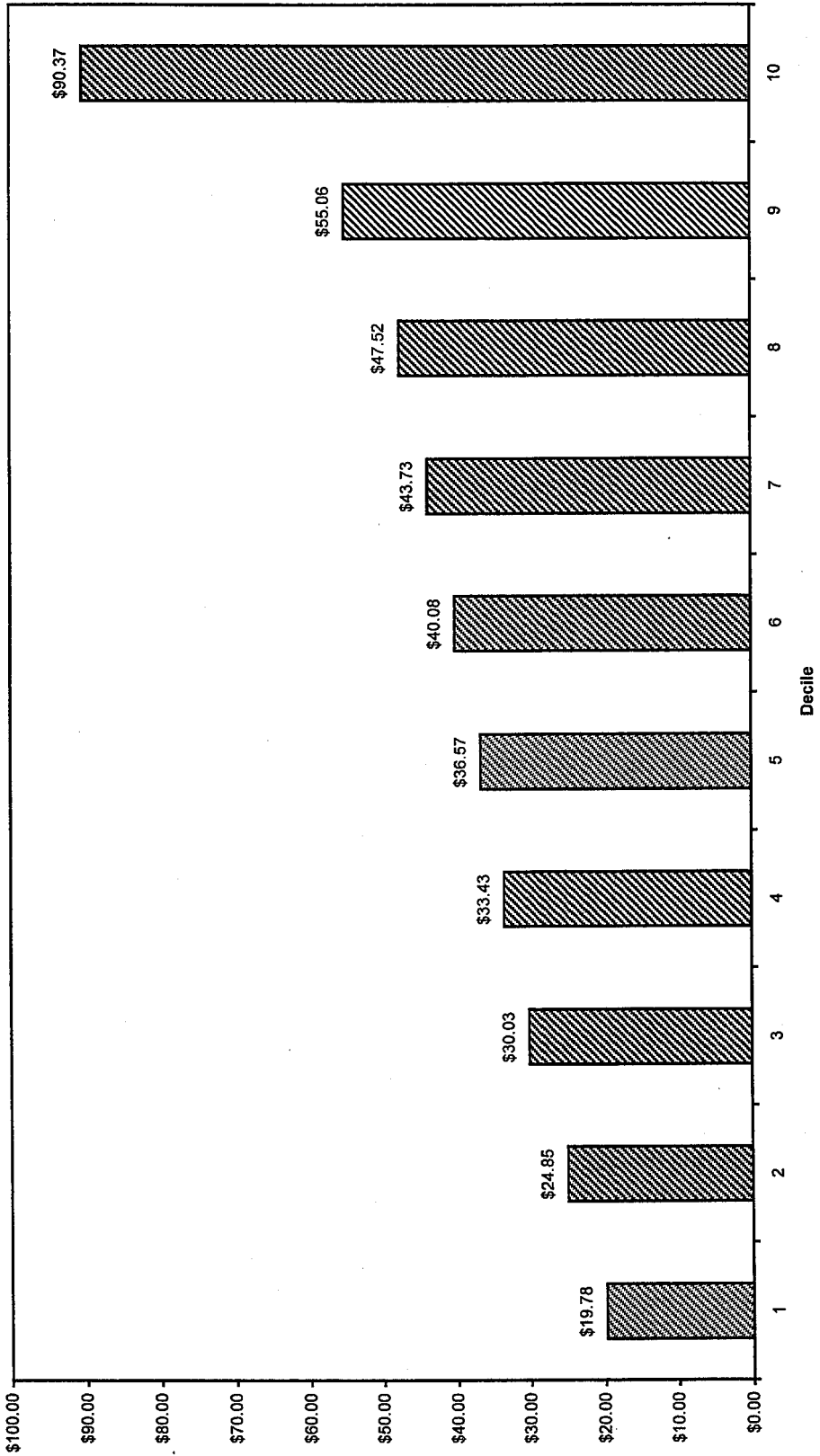
<http://nceph.anu.edu.au/> (follow links to Publications/Working Papers)

This section of the report will provide a brief overview of the results and highlight the main findings.

The average cost per encounter by diagnosis, across all encounters for each problem (i.e. single and multi-problem encounters), ranged from a low of \$10.39 for the problem R32 (Respiratory sensitivity test) up to \$304.57 for problem W90 (Normal delivery liveborn). The average cost per encounter by decile is shown in Figure 4.<sup>3</sup> This also shows the considerable variation in average cost per encounter by diagnosis.

<sup>3</sup> The average cost per encounter for a decile is the simple average of the average cost per encounter by diagnosis within each decile when the diagnoses are ranked from lowest to highest average cost per encounter.

**FIGURE 4**  
**AVERAGE COST PER ENCOUNTER DECILES**



The average costs per encounter for the five diagnoses with the highest and lowest average cost per encounter are shown in Table 5. Several salient points emerge from this Table. First, while the highest average cost per encounter was \$304.57 for W90, the gradient in average cost per encounter over the diagnoses/problems with the five highest average cost per encounter was quite steep. The diagnosis with the fifth highest average cost per encounter (U41) had an average cost of \$147.55 per encounter. Second, within the diagnoses/problems with the highest average cost per encounter, the high cost is accounted for by either a high cost identified MBS item number for a procedural service (W90, K43, U41) or a relatively high cost imaging item (B69, B67). Third, in the five diagnoses/problems with the lowest cost per encounter, the only non-zero cost component is the cost of the identified MBS item number (i.e. there were no flow-on costs from the GP consultation).

Table 6 again shows the five diagnose/problems with the highest and lowest average costs per encounter, but in this Table the ranking is based on the average cost per encounter at encounters where the diagnosis/problem is the only problem managed. The interest in encounters at which zero other problems are managed stems from the fact that all costs of such encounters are unambiguously assignable to the problem managed at the encounter. 'W90 Normal delivery liveborn' continued to be the diagnosis/problem with the highest average cost per encounter with a cost of \$345.10 at single problem encounters. Only this and one other problem managed (U41) are common to the 'top five' in Table 5 where the rankings are based on both single and multi-problem encounters. In the 'bottom five', three problems are common to Tables 5 and 6 (R32, H05, T67).

In general, these results demonstrate the importance of considering diagnosis-specific costs of encounters with general practitioners. The AMTS results and the analysis of costs of services based upon that survey lead to two major conclusions. First, the actual consultation cost of a GP encounter accounts for just less than half the costs of GP management of a problem - 'flow-on' costs arising from pathology, imaging, other tests, medications and treatments account for the remainder. Second, the average cost of an encounter with a GP, including all 'flow-on' costs, varies considerably by diagnosis/problem managed.

## 7. Concluding Comments

While this study has provided some insights into the costs of management of diseases and conditions by GPs, the limitations which have been mentioned at a number of points in this paper should not be overlooked. Some of these limitations arose because of the structure of the AMTS encounter form:

- ◆ the pathology and imaging ordered and other investigations were recorded in only broad terms, allowing only a rough estimate of their true cost;
- ◆ the tests, investigations and referrals were not directly connected to a single problem under management; and
- ◆ the medications prescribed were coded at generic level only. There was no information on number of repeats, brand, pack size etc. and this forced us to use averages or weighted averages (where available) to estimate medication costs. There was also no indication of the

**TABLE 5  
AVERAGE COST PER ENCOUNTER FOR FIVE DIAGNOSES WITH HIGHEST AND LOWEST AVERAGE COSTS PER ENCOUNTER**

Diagnosis code	Description	Ident. MBS item numbers	Cost category					All categories
			Pathology	Imaging	Other tests & investigations	Drugs	Treatments	
<i>Five diagnoses with highest average cost per encounter</i>								
W90	Normal delivery liveborn	271.08	3.07	0.00	0.00	0.00	30.42	304.57
B69	Blood, Blood forming organs, lymphatics, spleen - other reason for encounter	22.22	24.55	257.29	0.00	0.00	0.00	304.06
B67	Blood, Blood forming organs, lymphatics, spleen - referral	20.91	0.00	257.29	0.00	0.00	0.00	278.20
K43	Circulatory, other diagnostic procedure	106.00	24.55	0.00	24.45	0.00	0.00	155.00
U41	Urology, diagnostic radiology/imaging	147.55	0.00	0.00	0.00	0.00	0.00	147.55
<i>Five diagnoses with lowest average cost per encounter</i>								
Z65	Social, encounter initiated by other than patient/provider	15.81	0.00	0.00	0.00	0.00	0.00	15.81
T67	Endocrine, metabolic, nutritional - referral	15.65	0.00	0.00	0.00	0.00	0.00	15.65
H05	Blood in/from ear	10.70	0.00	0.00	0.00	0.00	0.00	10.70
S44	Skin - preventive immunisations/medications	10.70	0.00	0.00	0.00	0.00	0.00	10.70
R32	Respiratory sensitivity test	10.39	0.00	0.00	0.00	0.00	0.00	10.39

**TABLE 6**  
**AVERAGE COST PER ENCOUNTER FOR FIVE DIAGNOSES WITH HIGHEST AND LOWEST AVERAGE COSTS PER ENCOUNTER AT ENCOUNTERS WHERE THE PROBLEM IS THE ONLY PROBLEM MANAGED**

Diagnosis code	Description	Number of other problems managed at encounter				All encounters
		0	1	2	3	
<i>Five diagnoses with highest average cost per encounter</i>						
W90	Normal delivery liveborn	345.10	20.91			304.57
X58	Female genital, therapeutic counselling	236.43	33.19	36.08	20.91	84.72
D63	Digestive, follow-up encounter unspecified	166.03	189.79	31.50		104.70
U41	Circulatory, other diagnostic procedure	147.55				147.55
D24	Digestive, abdominal mass	145.56	115.38	55.48	87.46	115.73
<i>Five diagnoses with lowest average cost per encounter</i>						
T67	Endocrine, metabolic, nutritional - referral	15.65				15.65
H05	Blood in/from ear	10.70				10.70
B44	Blood, blood-forming organs - preventive immunisations/medications	10.39		86.31		35.70
R32	Respiratory sensitivity test	10.39				10.39
S67	Skin - referral	10.39	20.91	136.92		77.16

method by which the medication was given: whether prescribed or provided directly by the GP.

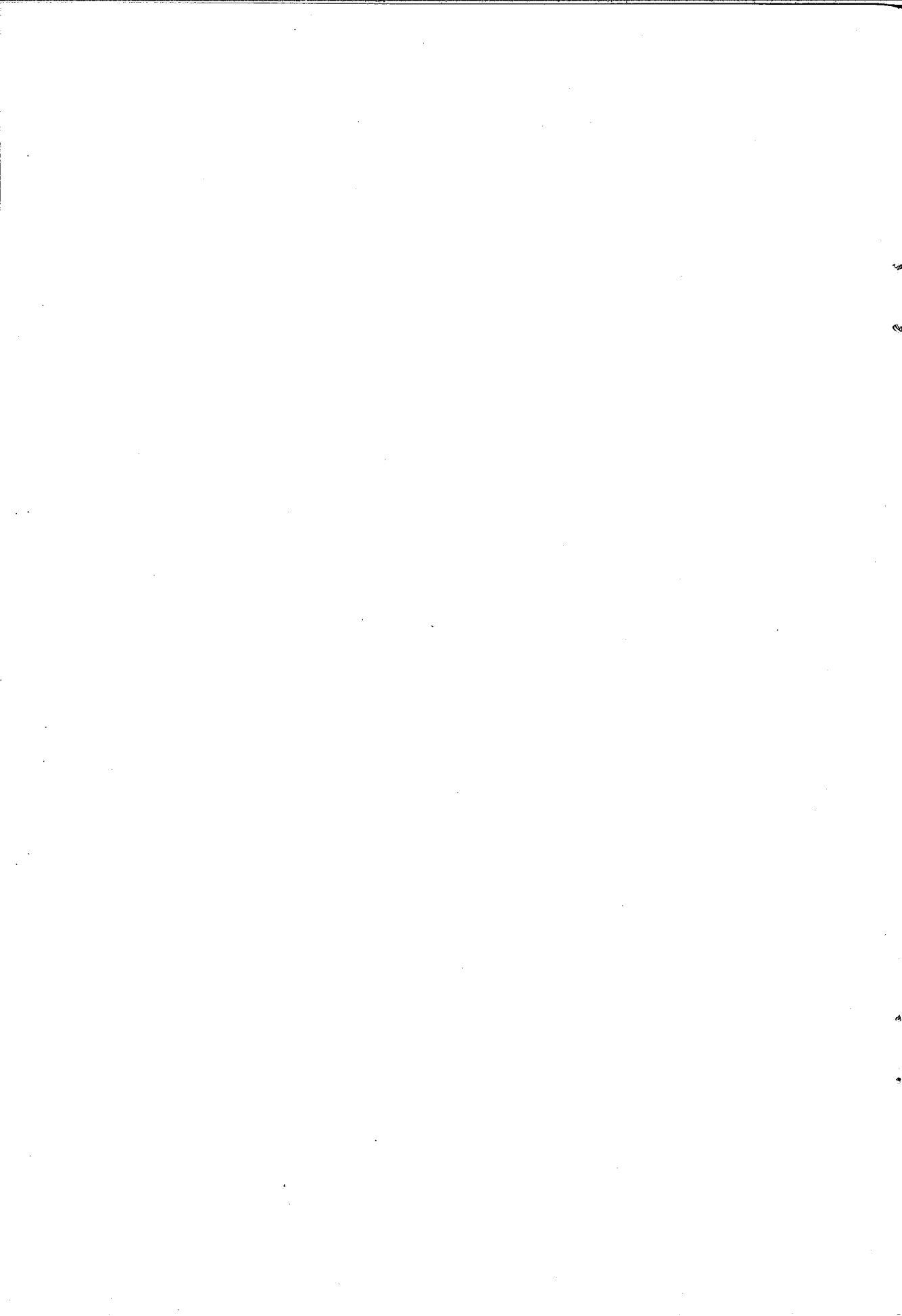
Many of these problems have been overcome more recently in the BEACH (Bettering the Evaluation and Care of Health) program - a continuous national study of general practice activity, conducted by the GP Statistics and Classification Unit, a collaborating Unit of the Australian Institute of Health and Welfare and the University of Sydney, within the Family Medicine Research Centre (Britt *et al* 1999, 2000). In BEACH all tests and investigations, and referrals and hospital admissions, can be directly linked to one or more problems under management. BEACH also includes more detailed data about the medications: the brand name of the medication; whether it was prescribed, advised for over the counter purchase (the latter were not included in the AMTS data collection), or supplied directly by the GP, and the number of repeats ordered for the medication. These more specific data would provide a better basis for estimating costs than was provided by the data in the AMTS. In addition, the Health Care Card status of the patient is recorded in BEACH, allowing some estimates of costs to government versus private contribution. This was not possible using the AMTS data.

Another major advantage of BEACH is that it is ongoing. Thus, it provides an opportunity to measure changes in problem-specific costs over time. As BEACH is currently in its fourth year of data collection, the costs of GP management for any area of particular concern over the last three years could be investigated.

In short, it is now feasible to provide more up-to-date, accurate and on-going estimates of the cost of GP management of specific problems than have been presented in this paper.

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**Appendix 2**  
**Per Capita Costs of GP Encounters by Age, Sex and Cost Category**  
(Australian dollars, 1991-92 prices)

	Identified MBS		Other tests & investigations				Total
	Items	Pathology	Imaging	Drugs	Treatments	Total	
<b>Females</b>							
<1	154.77	5.68	5.67	69.63	0.44	236.19	
1-4	94.61	4.22	3.94	48.66	1.65	153.26	
5-9	65.23	4.07	5.33	33.54	4.38	112.98	
10-14	52.94	3.93	8.43	24.04	5.02	94.88	
15-19	84.38	14.16	14.46	41.16	3.56	158.21	
20-24	111.80	25.73	21.15	46.34	3.97	209.46	
25-29	133.97	29.76	27.58	51.10	4.01	247.32	
30-34	122.79	28.31	29.48	53.55	3.70	238.90	
35-39	112.89	24.34	37.23	52.89	4.87	233.66	
40-44	112.58	23.50	48.01	59.87	6.00	251.60	
45-49	122.03	25.82	58.73	67.21	6.54	282.04	
50-54	143.88	29.88	54.89	93.02	7.00	331.14	
55-59	148.30	29.43	65.76	109.35	8.21	364.61	
60-64	187.62	33.79	60.63	148.35	12.07	446.35	
65-69	215.09	39.27	60.98	166.40	14.58	501.41	
70-74	251.67	37.67	51.15	197.01	15.22	557.79	
75-79	297.74	40.48	57.94	234.73	18.26	654.96	
80-84	337.74	35.18	49.27	234.08	17.26	679.23	
85+	434.17	51.83	67.16	259.44	26.21	844.95	
<b>Total</b>	<b>133.49</b>	<b>23.11</b>	<b>33.95</b>	<b>77.66</b>	<b>6.57</b>	<b>276.56</b>	

**Appendix 2 (cont.)**

	Identified MBS		Other tests &				Total
	Items	Pathology	Imaging	investigations	Drugs	Treatments	
<b>Males</b>							
<1	171.61	8.55	4.51	0.12	77.97	0.78	263.55
1-4	102.66	4.42	3.28	0.56	50.74	2.41	164.07
5-9	66.48	2.97	5.19	0.59	35.14	4.18	114.55
10-14	52.55	4.49	10.24	0.63	25.97	5.82	99.71
15-19	55.21	6.20	10.37	0.33	26.83	4.90	103.85
20-24	59.90	7.01	13.37	0.88	29.43	4.72	115.31
25-29	61.80	7.29	11.61	0.93	30.91	5.05	117.58
30-34	67.02	10.18	13.97	0.86	34.95	5.03	132.00
35-39	68.32	10.14	17.90	1.20	37.77	6.09	141.42
40-44	77.34	13.27	20.29	1.95	41.72	5.64	160.20
45-49	81.19	14.37	20.07	2.56	48.04	5.78	172.00
50-54	104.62	18.25	28.09	3.53	67.43	6.78	228.70
55-59	116.83	20.47	30.21	3.19	84.96	6.61	262.27
60-64	149.14	25.53	38.37	4.46	115.60	12.67	345.77
65-69	192.71	30.21	41.58	4.21	154.57	20.93	444.20
70-74	239.77	35.71	46.89	5.72	192.34	21.15	541.58
75-79	258.06	42.71	45.20	5.67	197.12	21.33	570.09
80-84	285.68	37.29	36.14	5.69	195.13	15.78	575.71
85+	492.79	60.64	86.23	11.83	309.46	26.82	987.76
<b>Total</b>	<b>94.47</b>	<b>12.63</b>	<b>18.45</b>	<b>1.82</b>	<b>58.12</b>	<b>6.99</b>	<b>192.47</b>

**Appendix 2 (cont.)**

	Identified MBS			Other tests & investigations			Total
	Items	Pathology	Imaging	Other tests & investigations	Drugs	Treatments	
<b>All persons</b>							
<1	163.41	7.15	5.08	0.06	73.91	0.61	250.22
1-4	98.74	4.32	3.60	0.38	49.73	2.04	158.81
5-9	65.87	3.51	5.26	0.51	34.36	4.28	113.79
10-14	52.74	4.22	9.36	0.58	25.03	5.43	97.36
15-19	69.42	10.08	12.36	0.40	33.81	4.25	130.33
20-24	85.49	16.24	17.21	0.68	37.77	4.35	161.72
25-29	97.79	18.49	19.57	0.91	40.98	4.53	182.27
30-34	94.89	19.24	21.72	0.97	44.24	4.36	185.42
35-39	90.63	17.25	27.58	1.32	45.34	5.48	187.61
40-44	94.80	18.34	34.02	1.79	50.71	5.82	205.48
45-49	101.18	19.98	39.00	2.14	57.42	6.15	225.87
50-54	124.08	24.02	41.37	3.00	80.11	6.89	279.48
55-59	132.39	24.90	47.79	3.38	97.02	7.40	312.87
60-64	168.46	29.67	49.55	4.17	132.04	12.37	396.26
65-69	204.35	34.93	51.68	4.67	160.73	17.63	473.98
70-74	246.32	36.79	49.23	5.36	194.91	17.89	550.50
75-79	281.30	41.40	52.66	5.75	219.15	19.53	619.80
80-84	318.55	35.96	44.43	5.70	219.73	16.72	641.08
85+	451.23	23.32	27.99	4.11	140.68	14.24	661.57
<b>Total</b>	<b>114.06</b>	<b>17.89</b>	<b>26.23</b>	<b>1.80</b>	<b>67.93</b>	<b>6.78</b>	<b>234.69</b>

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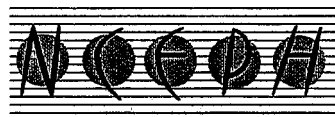
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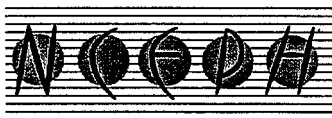
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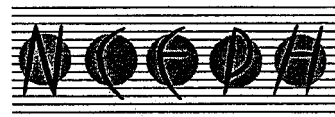
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