9 Medications

9.1 Source of medications

The survey form allowed the recording of up to four medications for each problem managed. Each medication could be recorded as prescribed (the default), recommended for over-the-counter purchase or supplied by the GP from surgery stocks or samples. GPs were requested to enter the brand or generic name, the strength, regimen and number of repeats ordered for each medication and to designate if this was a new or continued medication for that patient for this problem. This structure allowed analysis of the medications prescribed, advised by GPs for over-the-counter purchase and medications supplied by the GP, and the prescribed daily dose (PDD) of medications. Generic or brand names were entered into the database in the form recorded by the GP. Medications were classified using the CAPS system developed by the Family Medicine Research Centre from which they were also mapped to the ATC classification (World Health Organization Collaborating Centre for Drug Statistics Methodology (WHO) 1997), (see Chapter 2, 'Methods'). Although analysis can be conducted at brand name level, results in this chapter are reported only at the generic level.

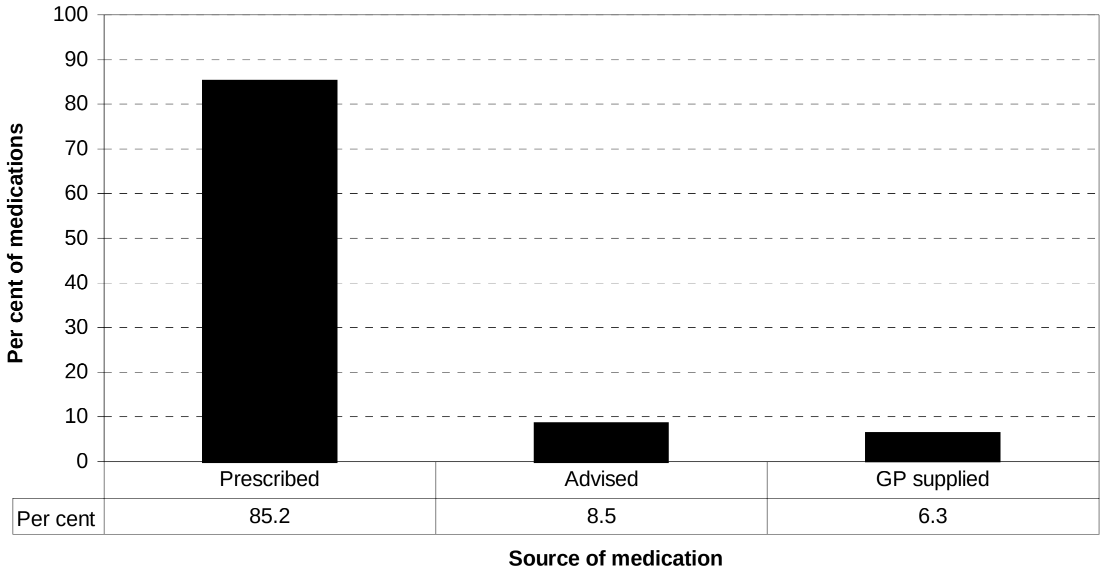


Figure 9.1: Distribution of medications by source

A total of 107,400 medications were recorded during this year of the BEACH survey, at a rate of 108 per 100 encounters and 75 per 100 problems managed. Most medications (85.3%) were prescribed. However, 8.3% of medications were recommended by the GP for purchase over-the-counter and 6.4% supplied to the patient by the GP (Figure 9.1). Extrapolated to the whole general practice population, this represents 8.3 million encounters per annum at which GPs recommended more than 9 million medications to their patients for purchase over-the-counter. At 6.4 million encounters GPs would have supplied 7 million medications directly to the patient.

9.2 Prescribed medications

There were 91,647 prescriptions recorded, at a rate of 92.3 per 100 encounters and 63.9 per 100 problems managed. At least one prescription was recorded at 59.8% of encounters and for over half (51.2%) of the problems managed.

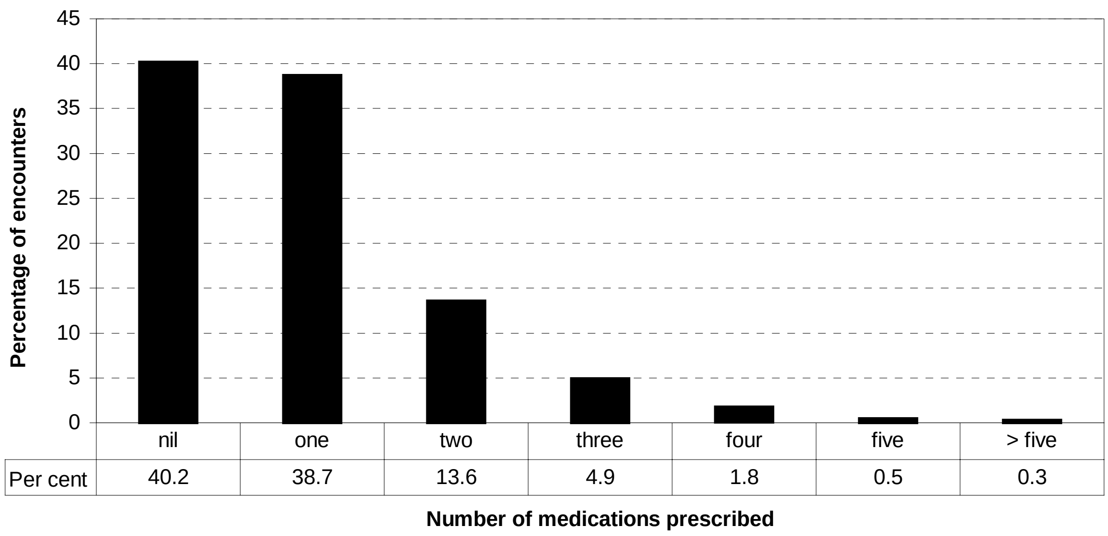


Figure 9.2: Number of medications prescribed per encounter

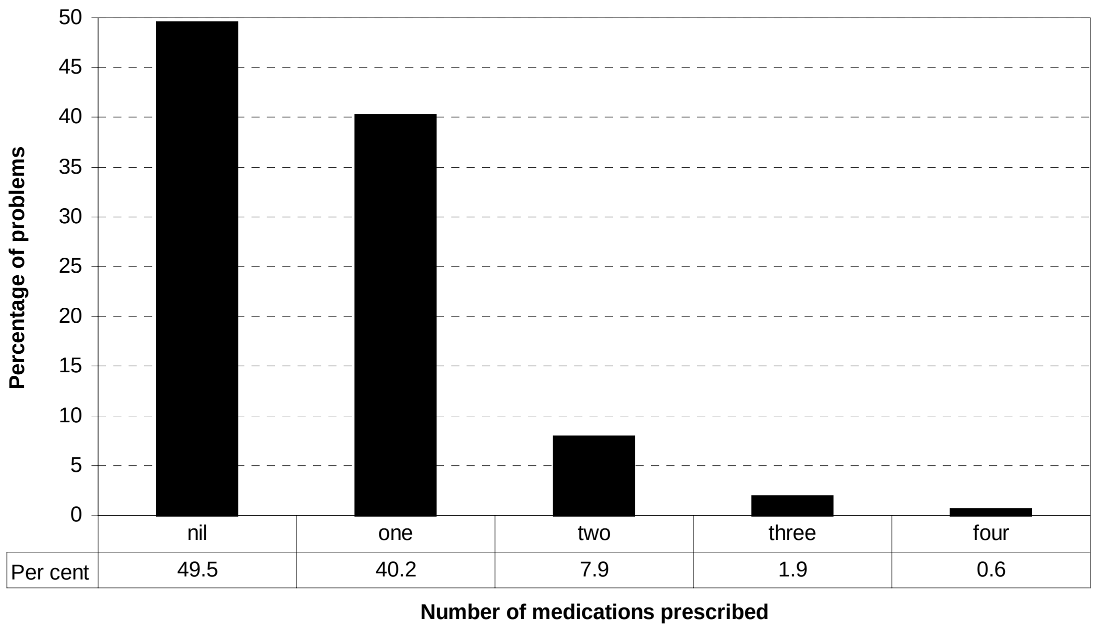


Figure 9.3: Number of medications prescribed per problem

The survey form allowed GPs to record up to four medications for each of four problems. A maximum of 16 medications could therefore be recorded at each encounter. These could be a mixture of medications prescribed, supplied or advised for over-the-counter purchase.

No medications were prescribed at 40.2% of encounters, one medication at 38.7% of encounters, two at 13.6% and three at 4.9%. Four or more medications were prescribed at only 2.6% of encounters (Figure 9.2). No prescription was given for almost half (48.8%) of all problems managed, one for 41.3%, two for 7.7% and three or more for 2.2% (Figure 9.3).

Number of repeats

GPs were also asked to record the number of repeat prescriptions ordered for each prescribed medication. There was a very high level of missing data in this field. For 43,142 prescriptions (47.1%) there was nothing recorded. For the remaining 48,504 prescriptions the distribution of the specified number of repeats (from specified zero to 6+) is provided in Figure 9.4. For one-third of these prescriptions the GP specified that no repeats had been prescribed and for 26.9% of prescriptions five repeats were ordered. The latter proportion reflects the PBS provision of one month's supply and five repeats for many medications used for chronic conditions such as hypertension. Ordering two repeats was not unusual (15.2%) but ordering three repeats, or six or more repeats, was relatively rare.

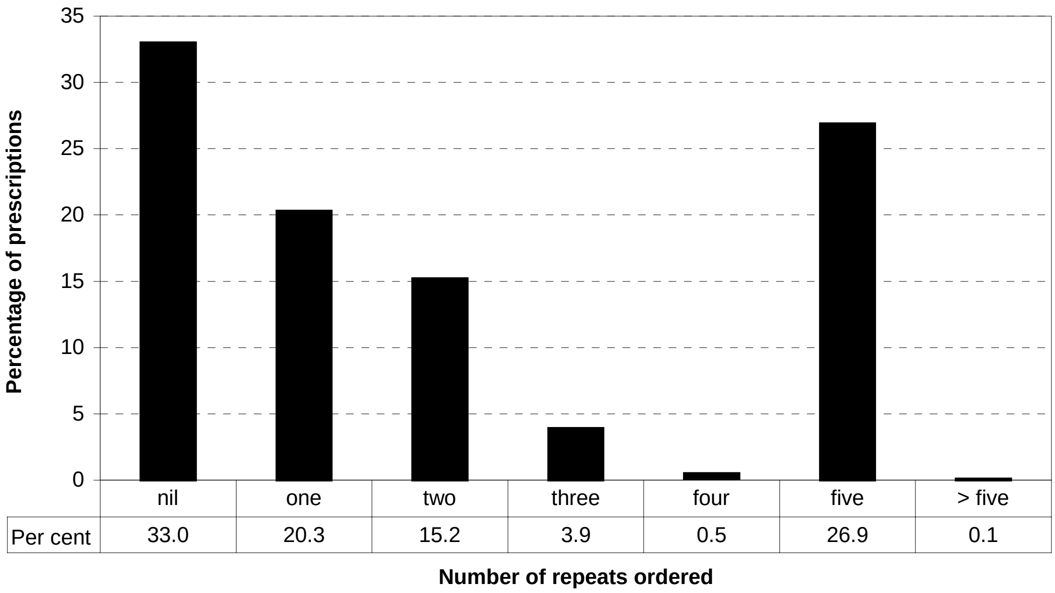


Figure 9.4: Number of repeats ordered per prescription

The level of missing data makes it difficult to extrapolate reliably to the total number of intended prescriptions (i.e. original plus repeats). However, if it is assumed that the missing data are random and distributed across all medication types in a similar manner to those for which repeat status was recorded, this would suggest that the participating GPs intended a total 219,662 medications to be dispensed as a result of these prescriptions. This extrapolates to about 230 million orders by recognised GPs in Australia per year.

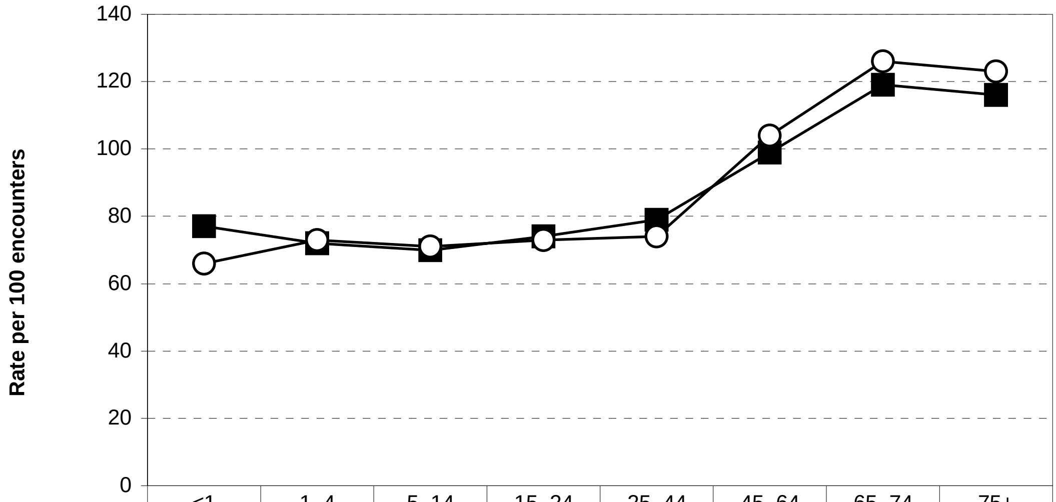
However, in the 2000 calendar year 130,223,517 dispensed prescriptions from recognised GPs were recorded in the PBS data (personal communication John Dudley, DHAC from HIC data). While it could be expected that some prescriptions are not presented for dispensing, the non-redemption rates for prescriptions in overseas studies have varied between 5.2% in the United Kingdom (Beardon et al. 1993) and 13% in a more comparable health system in New Zealand (Gardner et al. 1996). These non-redemption rates would not be sufficient to explain the difference here. The main cause of this discrepancy appears to be the lack of recording in the Pharmaceutical Benefits Scheme (PBS) data of medications that fall below the subsidy threshold and the lack of data on private prescriptions. This suggests that PBS data should not be used alone to monitor significant areas of general practice medication management.

The high level of missing repeat data in the second and third years of BEACH is disappointing. The research team has developed some better examples and more explicit instructions for participating GPs in an attempt to improve the response rate to this question in the current BEACH year.

Age–sex-specific rates of prescribed medications

Age–sex-specific charts show the prescription rate per 100 encounters for all the male or female patients respectively in the age group under consideration. Figure 9.5 shows that the prescription rate per 100 encounters was similar for males and females. It also shows the well described tendency for the number of prescriptions written at each encounter to rise with advancing age of the patient.

Figure 9.6, however, demonstrates that the age-based increase almost disappears if the prescription rate is related to problems. This suggests that the increased prescription rate in older patients is largely accounted for by the increased number of health problems that they have managed in general practice.



	<1	1–4	5–14	15–24	25–44	45–64	65–74	75+
Male	77	72	70	74	79	99	119	116
Female	66	73	71	73	74	104	126	123

Age group (years)

Figure 9.5: Age–sex-specific prescription rates per 100 encounters

Types of medications prescribed

Medications prescribed by major groups

The distribution of prescribed medications by major groups is presented graphically in Figure 9.7. Antibiotics were the most commonly prescribed group, representing 17.2% of all prescriptions. These were followed by cardiovascular (14.7%), central nervous system (12.0%), psychological (8.1%), musculoskeletal (7.3%) and respiratory (7.3%) medications.

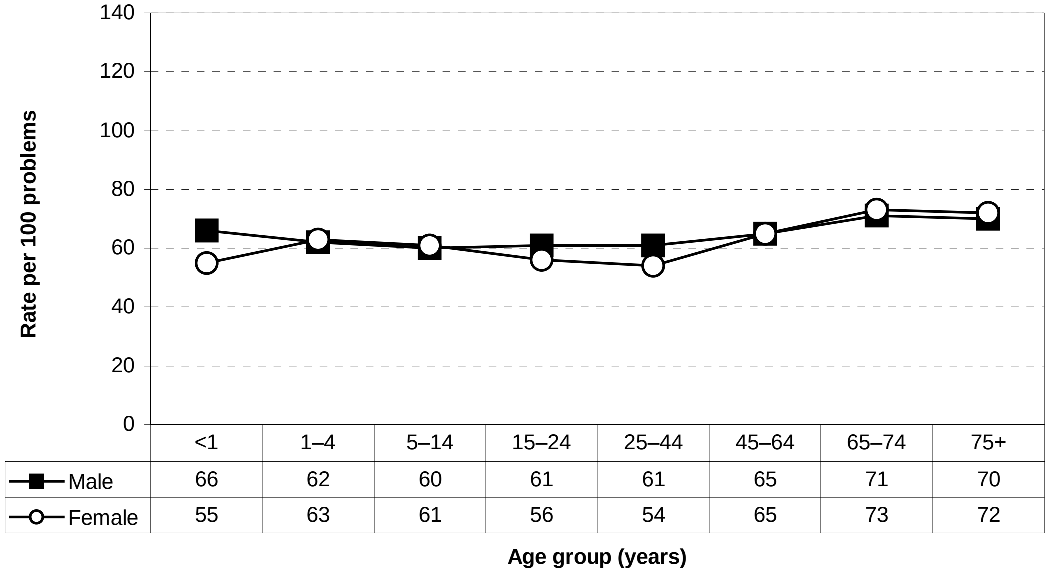


Figure 9.6: Age–sex-specific prescription rates per 100 problems

Table 9.1 shows the distribution of medications commonly prescribed by group, subgroup and generic name in order of medication group and subgroup frequency. In the antibiotic group, broad-spectrum penicillins were prescribed at a rate of 4.9 per 100 encounters. Amoxycillin and amoxycillin + potassium clavulanate were the most frequently prescribed generic drugs in that subgroup. Cephalosporins were prescribed almost as frequently at a rate of 4.0 per 100 encounters.

Within cardiovascular medications, antihypertensives accounted for more than half the prescriptions (7.3 per 100 encounters). Other cardiovascular medications, principally lipid-lowering agents, contributed 2.4 prescriptions per 100 encounters. Beta-blockers and anti-angina medications were also frequently recorded.

Prescribed central nervous system medications were mainly analgesics (8.9 per 100 encounters) and anti-emetics (1.5). Compound analgesics containing codeine continue to be a frequent choice. The psychological medications most frequently prescribed were anti-depressants.

Musculoskeletal drugs were frequently prescribed, at a rate of 6.8 per 100 encounters. These were mainly non-steroidal anti-inflammatory drugs, in particular the new coxib, Celecoxib.

Bronchodilators (3.2) and asthma preventives (2.2) made up the majority of respiratory medications prescribed, and in other groups, vaccines were prescribed at a rate of 3.9, topical steroid skin medications at a rate of 3.1, and digestive anti-ulcerants at a rate of 2.2 per 100 encounters.

The wide range of medications prescribed reflects the extensive variety of problems managed in general practice.

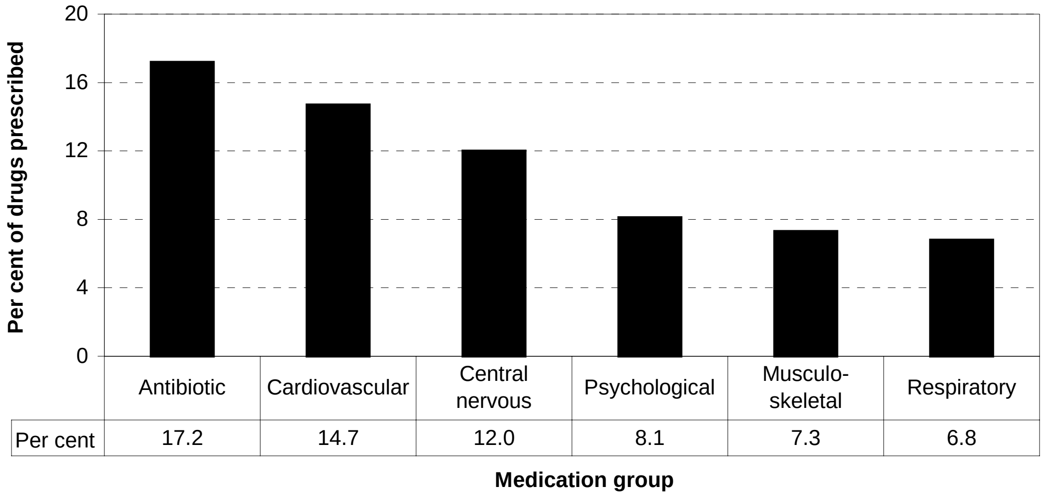


Figure 9.7: Distribution of prescribed medications by group

Table 9.1: Distribution of medications prescribed by group, subgroup, and generic medication

Group	Subgroup	Generic	Number	Per cent of scripts	Rate per 100 encs[(a)]	95% LCL	95% UCL
Antibiotics			15,790	17.2	15.9	15.3	16.5
	Broad spectrum penicillin		4,876	5.3	4.9	4.6	5.2
		Amoxycillin	3,189	3.5	3.2	2.9	3.5
		Amoxycillin+potassium clavulanate	1,680	1.8	1.7	1.4	1.9
	Cephalosporins		3,928	4.3	4.0	3.6	4.3
		Cephalexin	2,174	2.4	2.2	2.0	2.4
		Cefaclor monohydrate	1,631	1.8	1.6	1.3	2.0
	Other antibiotics		3,286	3.6	3.3	3.1	3.6
		Roxithromycin	1,593	1.7	1.6	1.4	1.8
		Erythromycin	810	0.9	0.8	0.6	1.0
	Penicillin		1,252	1.4	1.3	1.1	1.4
	Tetracycline		1,136	1.2	1.1	1.0	1.3
		Doxycycline	914	1.0	0.9	0.7	1.1
	Anti-viral		681	0.7	0.7	0.5	0.9

(continued)

Table 9.1 (continued): Distribution of medications prescribed by group, subgroup, and generic medication

Group	Subgroup	Generic	Number	Per cent of scripts	Rate per 100 encs[(a)]	95% LCL	95% UCL
Cardiovascular			13,509	14.7	13.6	12.8	14.4
	Antihypertensive		7,248	7.9	7.3	6.9	7.7
		Irbesartan	760	0.8	0.8	0.6	0.9
		Amlodipine	695	0.8	0.7	0.5	0.9
		Perindopril	626	0.7	0.6	0.4	0.8
		Indapamide	557	0.6	0.6	0.4	0.7
		Enalapril maleate	539	0.6	0.5	0.4	0.7
		Felodipine	523	0.6	0.5	0.4	0.7
	Other CVS drugs		2,620	2.9	2.6	2.4	2.8
		Atorvastatin	899	1.0	0.9	0.8	1.0
		Simvastatin	887	1.0	0.9	0.7	1.1
	Beta-blockers		1,592	1.7	1.6	1.4	1.8
		Atenolol	929	1.0	0.9	0.7	1.1
	Anti-angina		1,091	1.2	1.1	0.9	1.3
Cental nervous system			10,997	12.0	11.1	10.5	11.7
	Simple analgesic		4,723	5.2	4.8	4.3	5.2
		Paracetamol	3,890	4.2	3.9	3.5	4.4
		Aspirin	781	0.9	0.8	0.6	1.0
	Compound analgesic		2,708	3.0	2.7	2.5	2.9
		Paracetamol+codeine	2,171	2.4	2.2	2.0	2.4
	Anti-emetic/anti-nausea		1,473	1.6	1.5	1.3	1.6
		Prochlorperazine	738	0.8	0.7	0.6	0.9
		Metoclopramide	639	0.7	0.6	0.5	0.8
	Narcotic analgesic		1,370	1.5	1.4	1.0	1.8
	Anti-convulsant		540	0.6	0.5	0.4	0.7
Psychological			7,455	8.1	7.5	7.1	7.9
	Anti-depressant		3,029	3.3	3.1	2.8	3.3
		Sertraline	688	0.8	0.7	0.5	0.9
	Anti-anxiety		1,964	2.1	2.0	1.8	2.2
		Diazepam	1,034	1.1	1.0	0.9	1.2
		Oxazepam	710	0.8	0.7	0.6	0.9
		Phenothiazine	594	0.6	0.6	0.4	0.8
	Sedative hypnotics		1,867	2.0	1.9	1.7	2.1
		Temazepam	1,422	1.6	1.4	1.3	1.6

(continued)

Table 9.1 (continued): Distribution of medications prescribed by group, subgroup, and generic medication

Group	Subgroup	Generic	Number	Per cent of scripts	Rate per 100 encs[(a)]	95% LCL	95% UCL
Musculoskeletal			6,704	7.3	6.8	6.4	7.1
	NSAID/anti-rheumatoid		5,668	6.2	5.7	5.4	6.0
		Celecoxib	2,121	2.3	2.1	1.9	2.4
		Diclofenac sodium systemic	1,151	1.3	1.2	0.9	1.4
		Naproxen	544	0.6	0.5	0.3	0.7
		Ibuprofen	500	0.5	0.5	0.3	0.8
Respiratory			6,234	6.8	6.3	5.9	6.7
	Bronchodilator		3,169	3.5	3.2	2.9	3.4
		Salbutamol	2,067	2.3	2.1	1.9	2.3
		Terbutaline	607	0.7	0.6	0.4	0.8
		Ipratropium inhaled	491	0.5	0.5	0.3	0.7
	Asthma preventives		2,186	2.4	2.2	2.0	2.4
		Budesonide	545	0.6	0.5	0.4	0.7
		Fluticasone propionate	526	0.6	0.5	0.3	0.7
		Beclomethasone	635	0.6	0.6	0.4	0.8
		Fluticasone propionate	533	0.5	0.5	0.3	0.7
Hormones			5,820	6.4	5.9	5.6	6.2
	Sex hormones		2,049	2.2	2.1	1.9	2.2
		Medroxyprogesterone	527	0.6	0.5	0.4	0.7
	Hypoglycaemic		1,960	2.1	2.0	1.7	2.3
		Metformin	817	0.9	0.8	0.6	1.0
		Gliclazide	515	0.6	0.5	0.2	0.8
	Corticosteroids		1,209	1.3	1.2	1.1	1.4
	Other hormone		598	0.7	0.6	0.5	0.7
		Thyroxine	485	0.5	0.5	0.3	0.6
Skin			4,807	5.2	4.8	4.5	5.2
	Topical steroid		3,039	3.3	3.1	2.8	3.3
		Betamethasone topical	1,038	1.1	1.0	0.9	1.2
		Mometasone	657	0.7	0.7	0.5	0.8
		Hydrocortisone topical	564	0.6	0.6	0.4	0.7
	Anti-infection skin		914	1.0	0.9	0.7	1.1
	Other skin		848	0.9	0.9	0.6	1.1
Allergy, immune system			4,575	5.0	4.6	4.2	5.0
	Vaccine		3,839	4.2	3.9	3.4	4.3
		Influenza virus vaccine	1,491	1.6	1.5	0.8	2.2
	Anti-histamine		614	0.7	0.6	0.4	0.8

(continued)

Table 9.1 (continued): Distribution of medications prescribed by group, subgroup, and generic medication

Group	Subgroup	Generic	Number	Per cent of scripts	Rate per 100 encs(a)	95% LCL	95% UCL
Digestive			4,038	4.4	4.1	3.8	4.3
	Anti-ulcerants		2,159	2.4	2.2	2.0	2.3
		Ranitidine	1,015	1.1	1.0	0.9	1.2
	Anti-diarrhoeals		542	0.6	0.5	0.3	0.8
Ear, nose topical			2,304	2.5	2.3	2.2	2.5
	Topical nasal		1,326	1.4	1.3	1.2	1.5
		Budesonide topical nasal	876	1.0	0.9	0.7	1.1
	Topical otic		975	1.1	1.0	0.8	1.1
		Dexamethasone+framycetin	498	0.5	0.5	0.3	0.7
Blood			1,832	2.0	1.8	1.7	2.0
	Other blood		916	1.0	0.9	0.7	1.1
		Warfarin sodium	782	0.9	0.8	0.6	1.0
	Haemopoietic		915	1.0	0.9	0.8	1.1
Urogenital			1,812	2.0	1.8	1.7	2.0
	Diuretic		1,277	1.4	1.3	1.1	1.4
		Frusemide (Furosemide)	694	0.8	0.7	0.5	0.9
Contraceptives			1,634	1.8	1.6	1.5	1.8
	Oral contraception		1,634	1.8	1.6	1.5	1.8
		Levonorgestrel+ethinyloestradiol	1,202	1.3	1.2	1.1	1.4
Eye medications			1,633	1.8	1.6	1.5	1.8
	Anti-infectives eye		1,036	1.1	1.0	0.9	1.2
		Chloramphenicol eye	854	0.9	0.9	0.7	1.0
Nutrition, metabolism			1,364	1.5	1.4	1.2	1.5
	Mineral tonic		540	0.6	0.5	0.4	0.7
Miscellaneous			590	0.6	0.6	0.4	0.8
Anti-neoplastics			365	0.4	0.4	0.2	0.5
Surgical preparations			117	0.1	0.1	0.0	1.2
Diagnostic agents			67	0.1	0.1	0.0	0.4

(a) Column will not add to 100 because multiple prescriptions could be written at each encounter.

Note: Scripts—prescriptions, encs—encounters, LCL—lower confidence limit, UCL—upper confidence limit.

Most frequently prescribed generic medications

The 30 most frequently prescribed individual generic medications are listed in Table 9.2. Together these accounted for almost half (44.2%) of all prescribed medications. Antibiotics accounted for five of the top ten medications while simple analgesics were also frequently prescribed.

Celecoxib was the fifth most frequently prescribed medication even though it had been available on the Pharmaceutical Benefits Scheme for only two-thirds of the recording period.

Table 9.2: Most frequently prescribed medications

Generic drug	Number	Per cent of prescriptions	Rate per 100 encounters[(a)]	95% LCL	95% UCL
Paracetamol	3,890	4.2	3.9	3.5	4.4
Amoxycillin	3,189	3.5	3.2	2.9	3.5
Cephalexin	2,174	2.4	2.2	2.0	2.4
Paracetamol+codeine	2,171	2.4	2.2	2.0	2.4
Celecoxib	2,121	2.3	2.1	1.9	2.4
Salbutamol	2,067	2.3	2.1	1.9	2.3
Amoxycillin+potassium clavulanate	1,680	1.8	1.7	1.4	1.9
Cefaclor monohydrate	1,631	1.8	1.6	1.3	2.0
Roxithromycin	1,593	1.7	1.6	1.4	1.8
Influenza virus vaccine	1,491	1.6	1.5	0.8	2.2
Temazepam	1,422	1.6	1.4	1.3	1.6
Levonorgestrel+ethinyloestradiol	1,202	1.3	1.2	1.1	1.4
Diclofenac sodium systemic	1,151	1.3	1.2	0.9	1.4
Betamethasone topical	1,038	1.1	1.0	0.9	1.2
Diazepam	1,034	1.1	1.0	0.9	1.2
Ranitidine	1,015	1.1	1.0	0.9	1.2
Atenolol	929	1.0	0.9	0.7	1.1
Doxycycline	914	1.0	0.9	0.7	1.1
Atorvastatin	899	1.0	0.9	0.8	1.0
Simvastatin	887	1.0	0.9	0.7	1.1
Budesonide topical nasal	876	1.0	0.9	0.7	1.1
Chloramphenicol eye	854	0.9	0.9	0.7	1.0
Metformin	817	0.9	0.8	0.6	1.0
Erythromycin	810	0.9	0.8	0.6	1.0
Warfarin sodium	782	0.9	0.8	0.6	1.0
Aspirin	781	0.9	0.8	0.6	1.0
Irbesartan	760	0.8	0.8	0.6	0.9
Prochlorperazine	738	0.8	0.7	0.6	0.9
Oxazepam	710	0.8	0.7	0.6	0.9
Amlodipine	695	0.8	0.7	0.5	0.9
Subtotal	*40,321*	*44.2*	. .	. .	. .
Total prescribed medications	**91,647**	**100.0**	**92.3**	**89.9**	**94.7**

(a) Column will not add to 100 because multiple prescriptions could be written at each encounter.

Note: LCL—lower confidence limit, UCL—upper confidence limit.

Distribution of medications prescribed by ATC medication group

Table 9.3 shows the distribution of prescribed medications using the WHO ATC classification (World Health Organization Collaborating Centre for Drug Statistics Methodology (WHO) 1997) as an alternative method of grouping. This allows comparison with other data classified in ATC such as those produced by the HIC.

With this classification analgesics were the most frequently prescribed group, followed by penicillins and non-steroidal anti-inflammatory drugs. Other beta-lactam antibacterials, principally cephalosporins, were fourth, followed by inhaled adrenergics and anti-depressants.

Table 9.3: Distribution of medications prescribed by ATC medication group

ATC medication group	Number	Per cent of prescriptions	Rate per 100 encounters[(a)]	95% LCL	95% UCL
Other analgesics & antipyretics	7,059	7.7	7.1	6.6	7.6
Beta-lactam antibacterials penicillins	6,102	6.7	6.1	5.8	6.5
Anti-inflammatory/antirheumatic non-steroid	5,651	6.2	5.7	5.4	6.0
Other beta-lactam antibacterials	3,928	4.3	4.0	3.6	4.3
Adrenergics inhalants	3,080	3.4	3.1	2.9	3.3
Anti-depressants	3,029	3.3	3.1	2.8	3.3
ACE inhibitors–plain	2,900	3.2	2.9	2.7	3.1
Macrolides & lincosamides	2,734	3.0	2.8	2.5	3.0
Corticosteroids–plain	2,601	2.8	2.6	2.4	2.9
Viral vaccines	2,598	2.8	2.6	2.2	3.0
Cholesterol & triglyceride reducers	2,338	2.6	2.4	2.2	2.5
Other anti-asthmatic inhalants	2,317	2.5	2.3	2.1	2.5
Drugs for treatment of peptic ulcer	2,159	2.4	2.2	2.0	2.3
Anxiolytics	1,964	2.1	2.0	1.8	2.2
Hypnotics & sedatives	1,862	2.0	1.9	1.7	2.1
Hormonal contraceptives systemic	1,817	2.0	1.8	1.7	2.0
Beta blocking agents–plain	1,679	1.8	1.7	1.5	1.9
Oral blood glucose lowering drugs	1,648	1.8	1.7	1.4	1.9
Selective calcium channel blockers	1,563	1.7	1.6	1.4	1.8
Opioids	1,401	1.5	1.4	1.2	1.6
Antipsychotics	1,334	1.5	1.3	1.2	1.5
Decongestants & other nasal preparations	1,285	1.4	1.3	1.1	1.5
Corticosteroids for systemic use—plain	1,204	1.3	1.2	1.1	1.4
Angiotensin II antagonists—plain	1,186	1.3	1.2	1.0	1.3
Anti-infectives	1,154	1.3	1.2	1.0	1.3

(continued)

Table 9.3 (continued): Distribution of medications prescribed by ATC medication group

ATC medication group	Number	Per cent of prescriptions	Rate per 100 encounters[(a)]	95% LCL	95% UCL
Tetracyclines	1,136	1.2	1.1	1.0	1.3
Antithrombotic agents	962	1.0	1.0	0.8	1.2
Oestrogens	951	1.0	1.0	0.8	1.1
Propulsives	806	0.9	0.8	0.6	1.0
Corticosteroids & anti-infectives	755	0.8	0.8	0.6	0.9
Subtotal	*69,204*	*75.5*	. .	. .	. .
Total medications prescribed	**91,647**	**100.0**	**92.3**	**89.9**	**94.7**

(a) Column will not add to 100 because multiple prescriptions could be written at each encounter.

Note: UCL—upper confidence limit, LCL—lower confidence limit.

9.3 Medications advised for over-the-counter purchase

The total number of medications recorded as recommended by the GP for over-the-counter purchase was 8,906, a rate of 9.0 per 100 encounters and 6.2 per 100 problems managed. At least one medication was recorded as advised at 8.0% of encounters and for 5.6% of problems.

Types of medications advised

Medications advised by major groups

Central nervous system medications predominated in those advised to patients, with almost one-third of the advised medications being in this group. They were followed by respiratory medications and those in the skin and digestive medication groups (Figure 9.8).

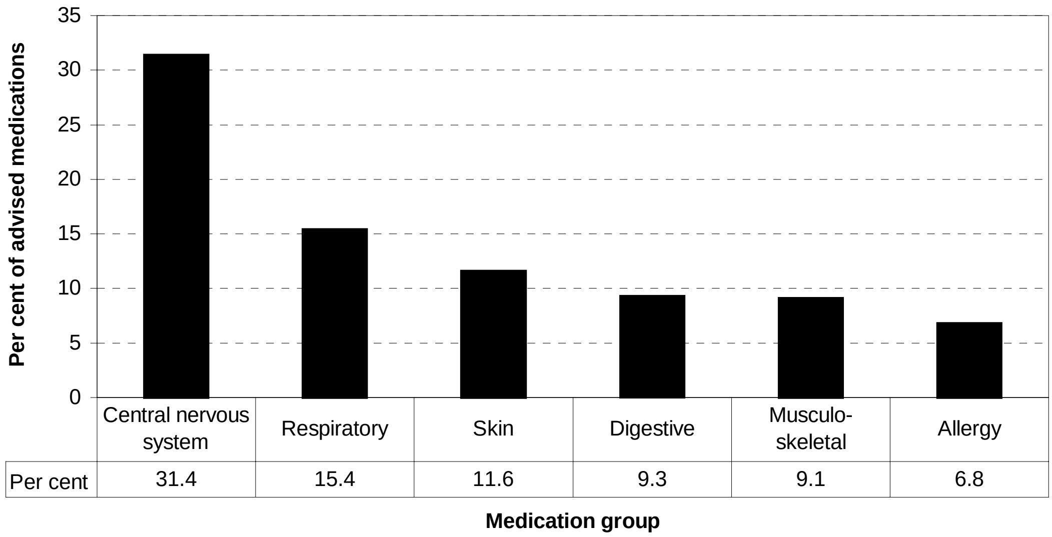


Figure 9.8: Distribution of advised medications by major groups

The distribution of the most frequently advised medications by generic name shows that paracetamol was the most common, accounting for 26.3% of all advised over-the-counter medications (Table 9.4). Although other medications were advised in relatively small numbers, the range of medications was wide. Most frequent of these included analgesics, cold relievers, anti-histamines and skin preparations. The 30 medications listed in this table accounted for two-thirds of all over-the-counter medications advised.

Table 9.4: Most frequently advised over-the-counter medications

Generic medication	Number	Per cent of OTCs	Rate per 100 encounters	95% LCL	95% UCL
Paracetamol	2,338	26.3	2.4	1.8	2.9
Ibuprofen	470	5.3	0.5	0.2	0.8
Loratadine	244	2.7	0.2	0.0	0.6
Clotrimazole topical	215	2.4	0.2	0.0	0.5
Chlorpheniramine+pseudoephidrine	205	2.3	0.2	0.0	0.7
Paracetamol+codeine	186	2.1	0.2	0.0	0.5
Brompheniramine+phenylephrine	184	2.1	0.2	0.0	0.7
Diclofenac diethyl topical	165	1.9	0.2	0.0	0.6
Pseudoephedrine	156	1.7	0.2	0.0	0.6
Aspirin	146	1.6	0.1	0.0	0.5
Fexofenadine	138	1.5	0.1	0.0	0.5
Clotrimazole vaginal	133	1.5	0.1	0.0	0.4
Sodium+potassium+citric-glucose	117	1.3	0.1	0.0	0.6
Pholcodine	117	1.3	0.1	0.0	0.6
Sorbolene+glycerol+cetomac	103	1.2	0.1	0.0	0.5
Chlorpheniramin+phenylephrine	101	1.1	0.1	0.0	0.5
Cetirzine	71	0.8	0.1	0.0	0.5
Bromhexine	70	0.8	0.1	0.0	0.6
Sodium citrotartrate+tartaric acid	69	0.8	0.1	0.0	0.4
Promethazine hydrochloride	66	0.7	0.1	0.0	0.4
Loperamide	65	0.7	0.1	0.0	0.5
Cinchocaine+hydrocortisone	64	0.7	0.1	0.0	0.4
Sodium chloride topical nasal	62	0.7	0.1	0.0	0.9
Vitamin C (ascorbic acid)	58	0.6	0.1	0.0	1.2
Hyoscine butylbromide	58	0.6	0.1	0.0	0.6
Cream/ointment/lotion NEC	57	0.6	0.1	0.0	0.4
Calamine lotion	57	0.6	0.1	0.0	0.4
Codeine+paracetamol+pseudoephedrine	56	0.6	0.1	0.0	0.6
Simethicone+magnesium+aluminium hydroxide	55	0.6	0.1	0.0	0.4
Subtotal	*5,826*	*65.1*	. .	. .	. .
Total medications advised	**8,906**	**100.0**	**9.0**	**8.1**	**9.8**

Note: OTCs—over the counter medications, LCL—lower confidence limit, UCL—upper confidence limit, NEC—not elsewhere classified.

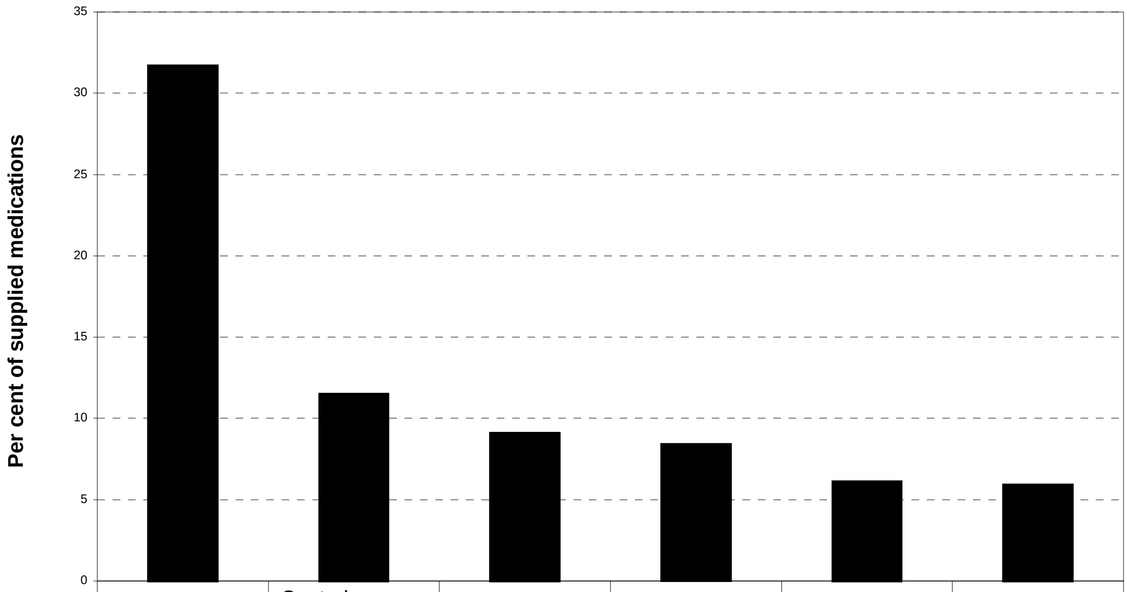
9.4 Medications supplied by general practitioners

General practitioners supplied their patients with a total of 6,847 medications in this study, at a rate of 6.9 medications per 100 encounters and 4.7 per 100 problems. At least one medication was supplied at 5.1% of encounters and for 3.8% of problems.

Types of medications supplied by GPs

Medications supplied by GPs by major groups

The distribution of supplied medications by group showed that those acting on the allergy / immune system constituted almost one-third of all medications supplied. This result probably reflects the direct GP supply of childhood vaccines in most parts of Australia. Central nervous system medications made up 11.5% and cardiovascular medications 9.1% of GP-supplied medications (Figure 9.9).



	Allergy /immune	Central nervous system	Cardiovascular	Mulsculoskeletal	Psychological	Antibiotics
Per cent	31.7	11.5	9.1	8.4	6.1	5.9

Figure 9.9: Distribution of GP-supplied medications by major groups

Of the top five most common medications supplied by the GP, four were vaccines, principally influenza virus vaccine, which accounted for 8.6% of GP-supplied medications (Table 9.5). There was a wide spread of other medications supplied, mostly prescription medications, presumably from manufacturers' sample packs. They reflect a range of medications which may be needed acutely in a situation (such as out of pharmacy hours) where prescription medications cannot be obtained from other sources or where cost is an issue. The most common of these was the recently released non-steroidal anti-inflammatory drug (NSAID) Celecoxib, accounting for 4.8% of all medications supplied.

Table 9.5: Medications most frequently supplied by GPs

Generic medication	Number	Per cent of GP-supplied	Rate per 100 encounters	95% LCL	95% UCL
Influenza virus vaccine	587	8.6	0.6	0.0	1.4
Celecoxib	328	4.8	0.3	0.0	0.7
Polio vaccine oral sabin/injection	258	3.8	0.3	0.0	0.6
Triple antigen(diphtheria+pertussis+tetanus)	227	3.3	0.2	0.0	0.7
Haemophilus b vaccine	210	3.1	0.2	0.0	0.6
Metoclopramide	163	2.4	0.2	0.0	0.8
ADT/CDT (diphtheria+tetanus) vaccine	156	2.3	0.2	0.0	0.4
Mumps+measles+rubella vaccine	153	2.2	0.2	0.0	0.5
Hepatitis B vaccine	152	2.2	0.2	0.0	0.5
Paracetamol	121	1.8	0.1	0.0	1.1
Prochlorperazine	119	1.7	0.1	0.0	0.9
Salbutamol	98	1.4	0.1	0.0	0.8
Paracetamol+codeine	95	1.4	0.1	0.0	0.9
Pethidine hydrochloride	95	1.4	0.1	0.0	0.5
Levonorgestrel+ethinyloestradiol	76	1.1	0.1	0.0	0.6
Rofecoxib	71	1.0	0.1	0.0	0.8
Promethazine hydrochloride	65	1.0	0.1	0.0	0.8
Amoxycillin	64	0.9	0.1	0.0	2.1
Sertraline	64	0.9	0.1	0.0	0.5
Vitamin B12 (Cyanocobalamin)	62	0.9	0.1	0.0	0.7
Diphtheria+pertussis+tetanus+hepatitis B	59	0.9	0.1	0.0	0.6
Diazepam	58	0.9	0.1	0.0	1.0
Morphine sulphate	56	0.8	0.1	0.0	0.8
Cephalexin	55	0.8	0.1	0.0	0.9
Omeprazole	50	0.7	0.1	0.0	0.6
Diclofenac sodium systemic	47	0.7	0.0	0.0	1.1
Hepatitis A vaccine	45	0.7	0.0	0.0	0.8
Irbesartan	44	0.6	0.0	0.0	0.6
Fluticasone propionate	41	0.6	0.0	0.0	0.7
Methylprednisolone	40	0.6	0.0	0.0	0.5
Subtotal	*3,659*	*53.5*	. .	. .	. .
Total medications supplied	**6,847**	**100.0**	**6.9**	**5.7**	**8.1**

Note: LCL—lower confidence limit, UCL—upper confidence limit.

9.5 Changes in medication rates between 1998–99, 1999–00 and 2000–01

Changes over time in medication rates per 100 encounters were investigated. The medications were grouped according to recommended use (e.g. medications for treating hypertension, medications for treating depression). Within these broad therapeutic groups the specific medications were further divided into pharmaceutical classes according to ATC classification (e.g. ACE inhibitors, calcium channel blockers). Trends over time in the use of each medication class within each therapeutic group of drugs were analysed using linear regression. All medications whether prescribed, advised for over-the-counter purchase, or supplied by the GP, were included.

The Taylor linearisation method was used to calculate robust standard errors that allow for the design effect of the cluster sampling (SAS Institute Inc. 1999). Test statistics and p-values based on the robust standard error are more conservative than those that are calculated without taking the design effect into account. Thus the robust standard error provides a more stringent test of significant changes over time.

Where there was a significant increase over time in the medication rates the analysis was performed again, adjusting for age and sex of encounters to examine whether demographic differences across the 3 years were confounding the estimates.

In the following analyses, changes in rates of selected medications are extrapolated to provide an estimate of the Australia-wide increase in the annual number of times the medication would have been prescribed, supplied or advised (where applicable). Note that this extrapolation does not provide an estimate of the increase in the number of prescriptions that cross the pharmacist's counter, as the number of repeats ordered by the GP has not been considered in these estimates.

Some of the medication types for which a significant change in prescribing rates are identified here, have been selected for more detailed investigation of the relationship between changes in and changes in medication rates, and changes problems management rates (see Chapter 7, Section 7.3). These analyses are reported in Chapter 14.

Medications for treatment of hypertension

Medications included in the analysis of pharmacological treatment of hypertension included the antihypertensives (ATC class C02), calcium channel blockers (C08), angiotensin II antagonists (C09C, C09D), ACE inhibitors (C09A, C09B) and beta-blocking agents (C07).

Although the medication rates for the hypertension medications listed above (combined) remained steady over time at around 9.2 medications per 100 encounters, there were significant trends in the rates of particular classes of hypertension medications.

There was a significant increase over time in the rates of angiotensin II antagonists, from 0.68 medications per 100 patient encounters in 1998–99 to 1.56 medications per 100 encounters in 2000–01 ($p < 0.0001$). This represents an estimated increase per year of 450,000 extra angiotensin II antagonist medications prescribed or supplied by GPs in Australia. This increase was offset by slight decreases in the rates of calcium channel blockers ($p < 0.0009$), ACE inhibitors ($p = 0.046$) and antihypertensives ($p < 0.0001$). Rates for beta-blockers remained steady over time. Adjusting for age and sex did not alter these results.

Medications for treatment of depression

Medications included in the analysis of the pharmacological treatment of depression were the serotonin reuptake inhibitors (SSRIs) (ATC code N06AB), tricyclic anti-depressants (N06AA) and the monoamine oxidase inhibitors (N06AF, N06AG).

The overall rate of these depression medications remained steady over time at around 3.1 medications per 100 encounters. There was a significant increase in the rate of SSRI medications, from 1.49 per 100 encounters in 1998–99 to 1.87 per 100 encounters in 2000–01 ($p < 0.0001$). This represented an estimated annual increase of 185,000 additional times on which SSRI medications were prescribed or supplied in general practice in Australia. The increase in rates of SSRIs was offset by significant decreases in the rates for tricyclic anti-depressants ($p < 0.0001$) and monoamine oxidase inhibitors ($p = 0.003$). Adjusting for age and sex did not alter the effect of time on rates of the anti-depressant medications.

Medications for treatment of peptic ulcer

The trend analysis for medications designed for the treatment of peptic ulcer included plain proton pump inhibitors (ATC group A02BC), proton pump inhibitor combinations for the treatment of helicobacter pylori (A02BD), and the H_2-receptor antagonists (A02BA).

The overall rates for medications designed for the treatment of peptic ulcer remained steady over time at around 2.3 medications per 100 encounters. Rates of PPIs and H_2-receptor antagonists remained unchanged over time at 0.7 and 1.6 per 100 encounters respectively.

Non-steroidal anti-inflammatory drugs (NSAIDs)

The analysis for non-steroidal anti-inflammatory drugs was based on the ATC group M01A, including the coxibs (M01AH) and all other NSAIDs (the remainder of M01A). There was a significant increase in the overall rate of prescription or supply of NSAIDs (as a group) over time, from 5.0 per 100 encounters in 1998–99 to 6.8 per 100 encounters in 2000–01, an average increase of 0.9 medications per 100 encounters per year ($p < 0.0001$). The Cox–2 inhibitors were not available in 1998–99. In 1999-00 they were available on private prescription and they came on to the PBS in the middle of the third BEACH data year. The increase in Cox–2 inhibitors was explained by this wider availability. Their rate of prescription / supply in 1999–00 was 0.3 per 100 encounters. This rate rose to 2.7 per 100 encounters in 2000–01 ($p < 0.0001$). The increase in the coxib annual medication rate is therefore likely to be an underestimate of the total increase had these medications been available on the PBS for the full year.

There was evidence of some substitution of coxibs for other NSAIDs, as the rate of non-specific NSAIDs decreased significantly from 5.0 per 100 encounters in 1998–99 to 4.1 per 100 encounters in 2000–01 ($p < 0.0001$). Note that these data include only eight months of availability of coxibs on the PBS.

Blood serum lipid-lowering agents

Analysis of medication rates for the blood serum lipid-lowering agents centred on the cholesterol and triglyceride reducers (ATC group C10A), in particular the HMG CoA reductase inhibitors or ‘statins’ (C10AA).

There was a significant increase over time in the rates of lipid-lowering medications, from 2.0 per 100 encounters in 1998–99 to 2.4 per 100 encounters in 2000–01 ($p = 0.0007$). This increase was accounted for by an increase in the rate of statin medications which rose from 1.9 per 100 encounters in 1998–99 to 2.3 per 100 encounters in 2000–01 ($p = 0.0001$). This represented an estimated national annual increase of 412,000 times that the GP prescribed one of these medications.

Asthma inhalants

The investigation of changes over time for asthma medications concentrated on the adrenergic and other inhalants (ATC codes R03A, R03B). The inhalants were classified as either preventive inhalants or as bronchodilaters / spasm relaxants according to CAPS (see Chapter 2, Section 2.6).

There was a significant decrease in overall asthma inhalant medication rates over time, from 6.2 medications per 100 encounters in 1998–99 to 5.7 per 100 encounters in 2000–01 ($p = 0.02$). All of this decrease occurred in the period 1999–00 to 2000–01. The decrease was accounted for by a decrease in medication rates for bronchodilaters from 3.9 per 100 encounters in 1998–99 to 3.4 per 100 encounters in 2000–01 ($p = 0.002$). Medication rates for asthma preventive inhalants have remained steady at around 2.4 per 100 encounters.

A more detailed investigation of the relationship between some of these changes in medication rates and the associated morbidity management rates is provided in Chapter 14.

10 Non-pharmacological management

For each problem managed, GPs could record up to two non-pharmacological treatments provided at the encounter. These were divided into two categories:

- clinical treatments: including general and specific advice, counselling or education, family planning and administrative processes. Non-pharmacological treatments classified as 'clinical' are listed in Appendix 4.
- procedural treatments, which encompassed all procedures carried out by general practitioners such as excision of skin lesion or application / removal of plaster cast.

Observations of the patient such as measurements of blood pressure, regarded as routine clinical measurements, were not included in the data collection program.

Non-pharmacological treatments were often provided by general practitioners to manage patient morbidity. A total of 49,072 were recorded for the year, a rate of 49.4 per 100 encounters and 34.2 per 100 problems managed. A breakdown of the non-pharmacological treatments showed that clinical treatments were three times more common than procedures (Table 10.1).

Table 10.2 shows the proportion of problems for which at least one non-pharmacological treatment was given. Pharmacological and non-pharmacological treatments were often combined to manage the presenting problem. However, for more than half of the problems that were managed with at least one non-pharmacological treatment (30% of problems), no pharmacological treatment was provided.

One in five problems was managed with a clinical treatment and for less than one in ten problems, the GP used a procedural treatment. The results presented in Table 10.2 indicate that problems managed with a clinical treatment were more likely to have concomitant pharmacological treatment than were problems managed a procedure (69.8% compared with 54.2%).

The rate of total non-pharmacological treatments per 100 encounters has significantly increased since the first year of BEACH (April 1998 to March 1999) from a rate of 43.2 per 100 encounters to 47.1 per 100 in 1999–00 ($p < 0.001$).

Table 10.1: Summary of non-pharmacological treatments

	Number	Rate per 100 encs	95% LCL	95% UCL	Rate per 100 problems	95% LCL	95% UCL
Non-pharmacological treatments	49,072	49.4	47.1	51.7	34.2	32.7	35.7
Clinical treatments	36,978	37.2	35.1	39.3	25.8	24.4	27.1
Procedural treatments	12,094	12.2	11.6	12.8	8.4	8.0	8.9

Note: Encs—encounters, UCL—upper confidence limit, LCL—lower confidence limit.

Table 10.2: Relationship of non-pharmacological management with pharmacological treatments

Co-management of problems with non-pharmacological treatments	Number of problems	Per cent within class	Per cent of problems (*n* = 143,528)	95% LCL	95% UCL
At least one non-pharmacological treatment	42,601	100.0	29.7	28.5	30.9
without pharmacological treatment	24,856	58.3	17.3	16.6	18.0
At least one clinical treatment	32,600	100.0	22.7	21.6	23.8
without pharmacological treatment	17,667	54.2	12.3	11.7	12.9
At least one procedural treatment	11,411	100.0	8.0	7.6	8.4
without pharmacological treatment	7,969	69.8	5.6	5.2	5.9

Note: LCL—lower confidence limit, UCL—upper confidence limit.

10.1 Clinical treatments

Number of clinical treatments at encounter

The total number of clinical treatments provided by GPs was 36,978, at a rate of 37.2 per 100 encounters (Table 10.1). GPs were more likely to provide 'clinical' treatments than 'procedural' in managing problems presented by patients.

Use of clinical treatment increased significantly from the 1998–99 rate of 31.4 per 100 encounters to 35.1 per 100 encounters in 1999–00 ($p < 0.001$).

Most frequent clinical treatments

There were three clinical treatments that were commonly provided by GPs. These were advice and education regarding the treatment of the patient's problem (11.9% of total non-pharmacological treatments), advice and education in general (11.7%) and advice/counselling pertaining to nutrition and weight (11.3%). Together this group accounted for one-third (34.9%) of all non-pharmacological treatments.

Treatment advice was provided at a rate of 5.9 per 100 encounters, and general advice/education was given at a rate of 5.8 and nutrition advice at a rate of 5.6 per 100 encounters. Counselling about the problem being managed (3.4 per 100 encounters) psychological counselling (2.8) and advice/education concerning medication (2.6) were also provided frequently. Table 10.3 lists a range of clinical treatments provided in order of decreasing frequency. These relate to various aspects of health such as medication and alcohol use, smoking, exercise, lifestyle, and occupational and relationship issues.

Problems managed with clinical treatments

A total of 32,600 problems included a clinical treatment as part of their management. The ten most common accounted for almost one-third (30.7%) of all problems for which a clinical treatment was provided.

Table 10.3: Problems most frequently managed with clinical treatment

Treatment	Number	Per cent of non-pharmacological treatments	Rate per 100 encounters (*n* = 99,307)	95% LCL	95% UCL
Advice/education—treatment*	5,839	11.9	5.9	5.1	6.6
Advice/education*	5,749	11.7	5.8	5.1	6.5
Counsel/advice—nutrition/weight*	5,531	11.3	5.6	4.9	6.2
Counselling—problem*	3,346	6.8	3.4	2.8	3.9
Counselling—psychological*	2,823	5.8	2.8	2.5	3.2
Advice/education—medication*	2,569	5.2	2.6	2.2	3.0
Counsel/advice—exercise*	2,139	4.4	2.2	1.7	2.6
Reassurance, support	1,523	3.1	1.5	1.1	2.0
Other admin/document*	1,442	2.9	1.5	1.2	1.7
Sickness certificate	1,078	2.2	1.1	0.4	1.8
Counsel/advice—smoking*	796	1.6	0.8	0.6	1.0
Observe/wait*	656	1.3	0.7	0.0	2.0
Counsel/advice—alcohol*	434	0.9	0.4	0.2	0.7
Counsel/advice—health/body*	431	0.9	0.4	0.0	0.8
Counsel/advice—relaxation*	351	0.7	0.4	0.1	0.6
Family planning*	318	0.7	0.3	0.1	0.6
Counsel/advice—lifestyle*	315	0.6	0.3	0.0	0.9
Counsel/advice—drug abuse*	314	0.6	0.3	0.0	1.5
Counsel/advice—prevention*	304	0.6	0.3	0.0	0.6
Counsel/advice—relationship*	285	0.6	0.3	0.0	0.6
Subtotal	*36,242*	*73.9*	. .	. .	. .
Total clinical treatments	**36,978**	**75.4**	**37.2**	**35.1**	**39.3**
Total non-pharmacological treatment	**49,072**	**100.0**	**49.4**	**47.1**	**51.7**

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 4).

Note: LCL—lower confidence limit, UCL—upper confidence limit.

The problem most often managed with a clinical treatment was depression (5.6% of problems managed with a clinical treatment), followed by URTI (5.2%), hypertension (4.4%) and lipid disorder (3.1%) (Table 10.4).

The two right-hand columns in Table 10.4 show the extent to which a clinical treatment was used for that problem and the relationship between the use of a clinical treatment and a medication. It can be seen that almost 50.0% of depression contacts were managed with a clinical treatment (usually psychological counselling) and, of these, 44.2% were not given a prescription as part of the treatment. Likewise, 47.7% of anxiety was managed with a clinical treatment and 60.0% of these did not receive a medication. Asthma was less likely to be managed with a clinical treatment (20.3%) and less likely to be managed with a clinical treatment and no prescription (23.8%).

Table 10.4: The ten problems most frequently managed with a clinical treatment

Problem managed	Number	Per cent of problems with clinical treatment	Rate per 100 encounters(a) (*n* = 99,307)	95% LCL	95% UCL	Per cent this problem(b)	Per cent of treated problems no meds(c)
Depression*	1,808	5.5	1.8	1.6	2.1	49.9	44.2
Acute upper respiratory infection	1,699	5.2	1.7	1.4	2.1	24.8	41.5
Hypertension*	1,419	4.4	1.4	1.0	1.8	16.6	41.3
Lipid disorder	1,017	3.1	1.0	0.8	1.3	35.2	62.5
Diabetes*	885	2.7	0.9	0.7	1.1	31.8	55.5
Anxiety*	785	2.4	0.8	0.6	1.0	47.7	60.0
Sprain/strain*	630	1.9	0.6	0.4	0.9	31.2	53.9
Back complaint*	598	1.8	0.6	0.4	0.8	23.3	46.9
Gastroenteritis, presumed infection	595	1.8	0.6	0.3	0.9	54.6	57.1
Asthma	573	1.8	0.6	0.4	0.8	20.3	23.8
Subtotal	*10,009*	*30.7*	. .	. .	. .	. .	. .
Total problems	**32,600**	**100.0**	**32.8**	**31.1**	**34.5**	**22.7**	**64.6**

(a) Rate of provision of clinical treatment for selected problem per 100 total encounters.

(b) Per cent of contacts with this problem that generated at least one clinical treatment.

(c) Per cent of contacts with problems that generated at least one clinical treatment without the provision of pharmacological treatment.

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).

Note: LCL—lower confidence limit, UCL—upper confidence limit, meds–medications.

10.2 Procedures

Number of procedures at encounter

Procedures included therapeutic actions and diagnostic procedures undertaken by the GP. ICPC–2 codes were grouped across ICPC–2 chapters for this analysis due to small numbers within each chapter. There were 12,094 procedures recorded, at a rate of 12.2 per 100 encounters (Table 10.1). The procedural codes and groupings are listed in Appendix 5.

Most frequent procedures

Table 10.5 lists the most frequent procedures. The most common procedure was the excision or removal of tissue (including destruction, debridement or cauterisation). It accounted for 5.3% of all non-pharmacological treatments and occurred at a rate of 2.6 per 100 encounters. This was followed by physical medicine or rehabilitation (including physiotherapy, massage and therapeutic exercises) which occurred at a rate of 2.0 per 100 encounters, and accounted for 4.1% of all non-pharmacological treatments.

Diagnostic procedures included taking Pap smears, physical function tests such as peak flow readings, and electrical tracings. These results do not reflect the true rate of, for example, Pap smears because most diagnostic tests were recorded in the Investigation section of the recording form and are therefore described in Chapter 12, 'Investigations'.

Problems managed with a procedure

A total of 11,411 problems involved a procedure in their management. The top 10 problems accounted for 40.0% of all problems for which a procedure was reported. These problems were commonly associated with skin complaints, injuries of various types, musculoskeletal problems and female genital check-ups / Pap smears (Table 10.6).

The individual problems most frequently managed with a procedure were solar keratosis / sunburn (6.5% of problems managed by a procedure), followed by lacerations and cuts (5.7%), warts (4.6%), excessive ear wax (4.2%) and female genital check-ups / Pap smears (4.2%) (Table 10.5).

Again, the two columns on the right side of the table show the proportion of the problem that was treated with a procedure and the likelihood of the patient receiving a concomitant medication. Many of the problems that were managed with a procedure did not have a medication prescribed, advised or given. Sixty-five per cent of solar keratosis were managed with a procedure and of these 97.3% did not have a medication associated with them.

Table 10.5: Most frequent procedures

Treatment	Number	Per cent of non-pharmacological treatments	Rate per 100 encounters (*n* = 99,307)	95% LCL	95% UCL
Excision/removal tissue/biopsy/destruction/ debridement/cauterisation*	2,621	5.3	2.6	2.4	2.9
Physical medicine/rehabilitation*	1,993	4.1	2.0	1.6	2.4
Dressing/pressure/compression/tamponade*	1,764	3.6	1.8	1.6	2.0
Other procedures/surgery NEC*	1,115	2.3	1.1	0.4	1.9
Incise/drain/flush/aspirate/remove body fluid*	1,047	2.1	1.1	0.9	1.2
Repair/fixation–suture/cast/prosthetic device (apply/remove)*	956	2.0	1.0	0.8	1.1
Pap smear	828	1.7	0.8	0.6	1.1
Physical function test*	457	0.9	0.5	0.0	1.0
Electrical tracings*	349	0.7	0.4	0.1	0.6
Subtotal	*11,128*	*22.7*	. .	. .	. .
Total procedures	**12,094**	**24.7**	**12.2**	**11.6**	**12.8**
Total non-pharmacological treatments	**49,072**	**100.0**	**49.4**	**47.1**	**51.7**

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 5).

Note: LCL—lower confidence limit, UCL—upper confidence limit, NEC–Not elsewhere classified.

Table 10.6: The ten problems most frequently managed with a procedure

Problem managed	Number	Per cent of problems with procedure	Rate per 100 encounters[(a)] (*n* = 99,307)	95% LCL	95% UCL	Per cent of this problem[(b)]	Per cent of treated problems no meds[(c)]
Solar keratosis/sunburn	699	6.1	0.7	0.4	1.0	65.0	97.3
Female genital check-up/Pap smear*	532	4.7	0.5	0.3	0.8	36.7	96.6
Sprain/strain*	518	4.5	0.5	0.2	0.8	25.6	55.5
Laceration/cut	507	4.4	0.5	0.4	0.7	66.8	77.0
Excessive ear wax	490	4.3	0.5	0.3	0.6	75.4	92.4
Warts	472	4.1	0.5	0.3	0.7	68.4	96.3
Back complaint*	393	3.5	0.4	0.1	0.7	15.3	52.9
Malignant neoplasm skin	352	3.1	0.4	0.1	0.6	42.0	96.5
Chronic ulcer skin (incl. varicose ulcer)	327	2.9	0.3	0.1	0.5	62.9	79.5
Fracture*	276	2.4	0.3	0.1	0.5	26.0	73.6
Subtotal	*4,565*	*40.0*	. .	. .	. .	. .	. .
Total problems	**11,411**	**100.0**	**11.5**	**10.9**	**12.1**	**8.0**	**69.8**

(a) Rate of provision of procedural treatment for selected problem per 100 total encounters.

(b) Per cent of contacts with this problem that generated at least one procedural treatment.

(c) Per cent of contacts with problems that generated at least one procedural treatment, without the provision of pharmacological treatment.

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).

Note: LCL—lower confidence limit, UCL—upper confidence limit, meds–medications.

11 Referrals and admissions

A referral is defined as the process by which the responsibility for part or all of the care of a patient is temporarily transferred to another health care provider. Only new referrals arising at the encounter were included (i.e. continuations were not recorded). For each problem managed, GPs could record up to two referrals. These included referrals to specialists, to allied health professionals, to hospitals for admission or to an emergency department. Referrals to hospital outpatient clinics were classified as specialist referrals.

11.1 Number of referrals and admissions

The patient was given at least one referral at 9.9% of all and for 6.9% of all problems managed. More than one referral could be recorded at an encounter. As a result, there were 10,366 referrals made at a rate of 10.4 per 100 encounters. The most frequent were referrals to a medical specialist (7.4 per 100 encounters), followed by referrals to allied health services (2.3 per 100). Very few patients were referred to hospital for admission (0.5 per 100 encounters) or to the emergency department of a hospital (0.1 per 100). For every 100 problems managed, 5.1 referrals to a specialist were made, and 1.6 were made to an allied health professional (Table 11.1).

Table 11.1: Summary of referrals and admissions

	Number	Rate per 100 encounters	95% LCI	95% UCI	Rate per 100 problems	95% LCL	95% UCL
At least one referral	9,862	9.9	9.6	10.3	6.9	6.6	7.1
Referrals	10,366	10.4	10.0	10.8	7.2	7.0	7.5
Specialist	7,326	7.4	7.1	7.7	5.1	4.9	5.3
Allied health service	2,313	2.3	2.1	2.5	1.6	1.5	1.7
Hospital	499	0.5	0.3	0.7	0.4	0.2	0.5
Emergency department	92	0.1	0.0	0.4	0.1	0.0	0.3
Other referrals	137	0.1	0.0	0.6	0.1	0.0	0.4

Note: LCL—lower confidence limit, UCL—upper confidence limit.

11.2 Most frequent referrals

Of the 10,366 referrals, 98.6% (n = 9,639) were referrals to specialists or allied health services. The top ten provider types in each category accounted for 67.3% of all referrals to medical specialists and 78.6% of those to allied health services respectively (Table 11.2). Note that this table does not show referrals where the GP did not specify the type of provider—e.g. *'referral to specialist'* (2.9% of all referrals) and *'referral health professional'* (1.4%).

Table 11.2: Most frequent referrals to specialists and allied health professionals

Professional to whom patient referred	Number	Per cent of all referrals	Per cent of referral group	Rate per 100 encounters (*n* = 104,856)	95% LCL	95% UCL
Medical specialist	**7,326**	**74.9**	**100.0**	**7.4**	**7.1**	**7.7**
Referral; surgeon	714	7.3	9.7	0.7	0.6	0.8
Referral; orthopaedic surgeon	670	6.9	9.1	0.7	0.5	0.8
Referral; ophthalmologist	642	6.6	8.8	0.7	0.5	0.8
Referral; dermatologist	594	6.1	8.1	0.6	0.5	0.7
Referral; gynaecologist	544	5.6	7.4	0.6	0.4	0.7
Referral; ENT	513	5.2	7.0	0.5	0.4	0.6
Referral; cardiologist	368	3.8	5.0	0.4	0.2	0.5
Referral; gastroenterologist	321	3.3	4.4	0.3	0.2	0.5
Referral; urologist	283	2.9	3.9	0.3	0.1	0.4
Referral; psychiatrist	267	2.8	3.6	0.3	0.1	0.5
Subtotal: top ten specialist referrals	*4,927*	*51.1*	*67.3*	. .	. .	. .
Allied health and other professionals	**2,313**	**23.7**	**100.0**	**2.3**	**2.1**	**2.5**
Referral; physiotherapy	946	9.7	40.9	1.0	0.8	1.1
Referral; dentist	156	1.6	6.7	0.2	0.0	0.4
Referral; psychologist	152	1.6	6.6	0.2	0.0	0.4
Referral; podiatrist/chiropodist	132	1.4	5.7	0.1	0.0	0.4
Referral; acoustic testing	108	1.1	4.7	0.1	0.0	0.3
Referral; dietitian/nutrition	103	1.1	4.5	0.1	0.0	0.4
Referral; optometrist	74	0.8	3.2	0.1	0.0	0.5
Referral; drug & alcohol	57	0.6	2.5	0.1	0.0	0.6
Referral; counsellor	46	0.5	2.0	0.1	0.0	0.4
Referral; chiropractor	43	0.5	1.9	0.0	0.0	0.5
Subtotal: top ten allied health referrals	*1,817*	*18.9*	*78.6*	. .	. .	. .
Total specialist & allied health referrals	**9,639**	**100.0**	**. .**	**9.7**	**9.3**	**10.1**

Note: LCL—lower confidence limit, UCL—upper confidence limit.

The most frequent referrals made to specialist medical practitioners were to surgeons (9.7% of all referrals to medical specialists), orthopaedic surgeons (9.1%), ophthalmologists (8.8%) and dermatologists (8.1%).

The majority of referrals to allied health services were to physiotherapists, which accounted for 40.9% of referrals of this type, and 9.7% of all referrals, followed by referrals to dentists (1.6% of all referrals), psychologists (1.6%), and podiatrists and chiropodists (1.4%) (Table 11.2).

11.3 Problems that were referred

A referral to a medical specialist was provided for a total of 7,460 problems managed. The ten problems most commonly associated with a referral to a medical specialist accounted for 18.5% of all problems associated with specialist referrals. The problems most often referred to a specialist were malignant neoplasms of the skin, pregnancy, and depression (Table 11.3). Each one of these accounted for 2.3% of all problems associated with a specialist referral.

Table 11.3: The ten problems most frequently referred to a medical specialist

Problem managed	Number	Per cent of problems referred	Rate per 100 encounters (*n* = 99,307)	95% LCL	95% UCL
Malignant neoplasm skin	172	2.3	0.2	0.0	0.4
Pregnancy*	171	2.3	0.2	0.0	0.4
Depression*	170	2.3	0.2	0.0	0.4
Diabetes*	147	2.0	0.2	0.0	0.4
Back complaint*	146	2.0	0.2	0.0	0.4
Osteoarthritis*	126	1.7	0.1	0.0	0.4
Oesophageal disease	122	1.6	0.1	0.0	0.4
Ischaemic heart disease*	117	1.6	0.1	0.0	0.3
Menstrual problems*	108	1.5	0.1	0.0	0.4
Acute internal damage knee	102	1.4	0.1	0.0	0.4
Subtotal: top ten problems referred to a medical specialist	1,381	18.5	. .	. .	. .
Total problems	**7,460**	**100.0**	**7.5**	**7.2**	**7.8**

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).

Note: UCL—upper confidence limit, LCL—lower confidence limit.

Referrals to allied health services were fewer in number (2,313), possibly because formal referrals to such services are not always required. There were 2,362 problems referred to an allied health professional or service. Table 11.4 shows the ten problems most commonly referred, which accounted for 40.6% of all problems referred to allied health services.

Sprains and strains were the problem type most frequently referred to allied health services (9.6% of problems referred), followed by back complaint (8.5%). Depression (4.6%), teeth / gum disease (3.8%) and diabetes (3.1%) also featured in the top ten problems referred to allied health and other services. Note that depression, diabetes and back complaints were referred relatively frequently to both allied health professionals and to medical specialists.

Of the 527 referrals for hospital admission, the problems under management were often acute in nature. Although the numbers involved are very small, it is interesting to note the types of problems for which hospital admission was sought. These included fractures (6.0% of problems referred for admission), appendicitis (3.3%) and asthma (2.3%). Cardiovascular problems such as heart failure, stroke and ischaemic heart disease were also referred for hospital admission. Referrals to psychiatric units / hospitals were included in this category (2.2%) (Table 11.5). and these were often associated with depression.

11.4 Changes in referral rates over time

There was a significant decrease in the rate of referral to allied health professionals between 1998–99 (3.0 per 100 encounters, 95% CI: 2.8–3.2) and 2000–01 (2.3 95% CI: 2.1–2.5). However, this was probably due to a change in classification, which moved referral for ECG from referral to an allied health professional to imaging.

Table 11.4: The ten problems most frequently referred to allied health services

Problem managed	Number	Per cent of problems referred	Rate per 100 encounters (*n* = 99,307)	95% LCL	95% UCL
Sprain/strain*	226	9.6	0.2	0.0	0.4
Back complaint*	201	8.5	0.2	0.0	0.4
Depression*	108	4.6	0.1	0.0	0.3
Teeth/gum disease	89	3.8	0.1	0.0	0.4
Diabetes*	74	3.1	0.1	0.0	0.5
Osteoarthritis*	60	2.5	0.1	0.0	0.4
Injury musculoskeletal NOS	54	2.3	0.1	0.0	0.5
Neck syndrome (incl. osteoarthritis)	52	2.2	0.1	0.0	0.3
Shoulder syndrome (incl. arthritis, osteoarthritis)	50	2.1	0.1	0.0	0.4
Anxiety*	44	1.9	0.0	0.0	0.4
Subtotal: top ten problems referred to AHP	*958*	*40.6*	. .	. .	. .
Total problems	**2,362**	**100.0**	**2.4**	**2.2**	**2.6**

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).

Note: UCL—upper confidence limit, LCL—lower confidence limit, NOS—not otherwise specified

Table 11.5: The ten most common problems referred to hospital

Problem managed	Number	Per cent of problems managed	Rate per 100 encs (*n* = 99,307)	95% LCL	95% UCL
Fracture*	31	6.0	0.03	0.0	0.5
Appendicitis	17	3.3	0.02	0.0	0.6
Asthma	12	2.3	0.01	0.0	0.8
Heart failure	12	2.3	0.01	0.0	0.7
Depression*	12	2.2	0.01	0.0	0.9
Pneumonia	11	2.0	0.01	0.0	0.6
Abdominal pain*	10	1.9	0.01	0.0	0.7
Stroke/cerebrovascular accident	10	1.9	0.01	0.0	0.8
Ischaemic heart disease*	10	1.9	0.01	0.0	0.6
Skin infection, other	10	1.8	0.01	0.0	0.7
Subtotal top ten problems referred for admission	*135*	*25.6*	. .	. .	. .
Total problems	**527**	**100.0**	**0.53**	**0.3**	**0.7**

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).

Note: Encs—encounters, UCL—upper confidence limit, LCL—lower confidence limit.

12 Investigations

The GPs participating in the study were asked to record (in free text) any pathology, imaging or other tests ordered or undertaken at the encounter and to nominate the patient problem(s) associated with each test order placed. This allows the linkage of test orders to a single problem or multiple problems. Up to five orders for pathology and two for imaging and other tests could be recorded at each encounter. A single test may have been ordered for the management of multiple problems and multiple tests may have been used in the management of a single problem.

A pathology test order may be for a single test (e.g. Pap smear, HbA1C) or for a battery of tests (e.g. lipids, FBC). Where a battery of tests was ordered, the battery name was recorded rather than each individual test. GPs also recorded the body site for any imaging ordered (e.g. x-ray chest, CT head).

There were no tests recorded at the vast majority (80.7%) of encounters. At least one pathology order was recorded at 13.8% of encounters (for 10.6% of problems managed), at least one imaging test was ordered at 6.8% of encounters (for 4.8% of problems managed) and at least one other investigation was ordered at 0.6% of encounters (for 0.4% of problems managed) (Table 12.1).

Table 12.1: Number of encounters and problems where pathology, imaging or other tests ordered

	Number of encs	Per cent of encs	95% LCL	95% UCL	Number of problems	Per cent of problems	95% LCL	95% UCL
Pathology, imaging and other investigations ordered	1,659	1.7	1.5	1.8	1,271	0.9	0.8	1.0
Pathology only ordered	12,012	12.1	11.7	12.5	13,924	9.7	9.4	10.0
Imaging only ordered	5,391	5.4	5.2	5.7	6,856	4.8	4.6	5.0
Other investigations only ordered	380	0.4	0.2	0.6	565	0.4	0.3	0.5
No tests ordered	80,133	80.7	80.1	81.3	122,181	85.1	84.7	85.6
Total (N)	**99,307**	**100.0**	. .	. .	**143,528**	**100.0**	. .	. .
At least one pathology ordered	13,671	13.8	13.3	14.3	15,196	10.6	10.2	10.9
At least one imaging ordered	6,720	6.8	6.5	7.1	6930	4.8	4.6	5.0
At least one other investigation	568	0.6	0.4	0.8	616	0.4	0.3	0.5

Note: Encs—encounters, LCL—lower confidence limit, UCL—upper confidence limit.

12.1 Pathology ordering

A comprehensive report on pathology ordering by general practitioners in Australia in 1998 written by the GP Statistics and Classification Unit using BEACH data was published on the Internet by the Diagnostics and Technology Branch of the Department of Health and Aged Care during 2000 (Britt et al. 1999a). For a more detailed study of pathology ordering, consult that publication; readers may wish to compare those results with the information presented below.

Nature of pathology orders at encounter

There were 29,225 orders for a pathology test (or battery of tests) and these were made at a rate of 29.4 per 100 encounters. Table 12.2 provides a summary of the different types of pathology tests that were ordered by the participating GPs.

The pathology tests recorded were grouped according to the categories set out in Appendix 7. The main pathology groups reflect those used in previous analyses of pathology tests recorded by the HIC (Health Insurance Commission (HIC) 2000).

The top four pathology test groups were Chemistry, Haematology, Microbiology and Cytology and together these accounted for over 90% of all pathology test orders. The fifth largest group was Other NEC (other pathology test orders that could not be classified elsewhere), which made up 3.7% of all pathology test orders. The size of this group was in part due to the non-specificity of the recording of some pathology orders by some GPs (e.g. blood test).

The largest of the groups, Chemistry, accounted for 52.3% of all tests and was recorded at a rate of 15.4 per 100 encounters. Within this group the most frequently ordered test was lipids (21.5%) followed by glucose (13.3%). Full blood count (67.4%) was the largest group within Haematology and urine, microscopy, culture and sensitivity (urine MC&S) (34.1%) was the largest in Microbiology.

The most frequently ordered test types were full blood count; lipids; glucose; liver function; electrolytes, urea and creatinine (EUC), urine MC&S, and Pap smear tests. Full blood counts accounted for 13.0% of tests and were ordered at a rate of 3.8 per 100 encounters. Pap smears accounted for 4.9% of all tests and made up the greater proportion of the Cytology group (96.6%). Lipid tests were ordered at a rate of 3.3 per 100 encounters (Table 12.2).

Problems associated with pathology tests

Table 12.3 describes, in decreasing order of frequency, the most common problems under management for which pathology was ordered.

There were 15,196 problems to which pathology tests were linked (Table 12.1). The three problems accounting for the highest number of pathology tests ordered were lipid disorder (6.4% of problems managed with a pathology order), hypertension (6.2%), diabetes (5.9%), weakness/tiredness general (4.2%), and female genital check-up (including Pap smear) (3.9%). This is not surprising given the distribution of pathology tests described in the previous table. However, the last two columns of the table provide some interesting contrasts. The second last column shows the per cent of contacts (with the selected problem) that resulted in an order for pathology. The last column shows the number of test orders placed when contact with the selected problem resulted in pathology tests.

Hypertension was the most common problem managed in general practice and there were 8,560 hypertension problems recorded in the data set (6.0% of problems). Diabetes problems (1.9% of problems) occurred far less frequently. However, diabetes problems accounted for almost as many pathology tests as did hypertension. There were 1,674 test orders (5.9%) associated with diabetes and 1,752 test orders (6.2%) associated with hypertension. This is explained by the fact that 26.5% of diabetes contacts resulted in a pathology test compared with 8.6% of contacts with hypertension.

Table 12.2: Distribution of pathology orders across pathology groups and most frequent individual test orders within group

Pathology test ordered	Number	Per cent of all pathology	Per cent of group	Rate per 100 encs (*n* = 99,307)	95% LCL	95% UCL
Chemistry	**15,292**	**52.3**	**100.0**	**15.4**	**14.6**	**16.2**
Lipids	3,292	11.3	21.5	3.3	3.0	3.6
Glucose—all*	2,033	7.0	13.3	2.1	1.8	2.3
Liver function	1,954	6.7	12.8	2.0	1.7	2.2
Electrolytes, urea & creatinine	1,879	6.4	12.3	1.9	1.6	2.2
Thyroid function	1,313	4.5	8.6	1.3	1.2	1.5
Multibiochemical analysis	1,168	4.0	7.6	1.2	0.7	1.7
Hormone assay	803	2.8	5.3	0.8	0.6	1.1
HbA1C	605	2.1	4.0	0.6	0.4	0.8
Ferritin	575	2.0	3.8	0.6	0.4	0.8
Prostate-specific antigen	460	1.6	3.0	0.5	0.3	0.6
Haematology	**5,628**	**19.3**	**100.0**	**5.7**	**5.3**	**6.0**
Full blood count	3,793	13.0	67.4	3.8	3.6	4.1
Erythrocyte sedimentation rate	849	2.9	15.1	0.9	0.7	1.1
Coagulation	758	2.6	13.5	0.8	0.6	0.9
Microbiology	**4,432**	**15.2**	**100.0**	**4.5**	**4.2**	**4.7**
Urine MC&S	1,513	5.2	34.1	1.5	1.4	1.7
Hepatitis serology	556	1.9	12.6	0.6	0.3	0.9
Microbiology; other	308	1.1	7.0	0.3	0.1	0.5
Vaginal swab and C&S	300	1.0	6.8	0.3	0.0	0.6
Faeces MC&S	278	1.0	6.3	0.3	0.1	0.5
HIV	260	0.9	5.9	0.3	0.1	0.4
Chlamydia	165	0.6	3.7	0.2	0.0	0.5
Cytology	**1,493**	**5.1**	**100.0**	**1.5**	**1.2**	**1.8**
Pap smear	1,442	4.9	96.6	1.5	1.2	1.7
Other NEC	**1,079**	**3.7**	**100.0**	**1.1**	**0.8**	**1.3**
Other NEC; other	445	1.5	41.2	0.5	0.2	0.6
Other NEC; blood test	412	1.4	38.2	0.4	0.0	1.0
Infertility/pregnancy	**270**	**0.9**	**100.0**	**0.3**	**0.0**	**0.6**
Histopathology	**444**	**1.5**	**100.0**	**0.5**	**0.2**	**0.7**
Histology; skin	351	1.2	79.1	0.4	0.1	0.6
Immunology	**539**	**1.9**	**100.0**	**0.5**	**0.3**	**0.8**
Immunology; other	216	0.7	40.0	0.2	0.0	0.5
Simple test; other	**46**	**0.2**	**100.0**	**0.1**	**0.0**	**0.5**
Total pathology tests	**29,225**	**100.0**	**100.0**	**29.4**	**28.2**	**30.7**

Note: Encs—encounters, LCL—lower confidence limit, UCL—upper confidence limit.

Weakness / tiredness was not a problem label that ranked in the top thirty problems managed in general practice, yet it ranked fourth highest in the problems associated with pathology ordering. This is because the decision to order a pathology test for weakness / tiredness was relatively frequent (48.8% of contacts generating an order) and where such a decision was made, multiple pathology tests were likely (averaging 348.9 test orders per 100 problems). The problem label of female genital check-up / Pap smear, and the associated Pap smear test, provide a useful contrast as multiple tests were rarely ordered.

Table 12.3: The ten problems for which pathology was most frequently ordered

Problem managed	Number of problems	Number of problem/path combinations[(a)]	Per cent of problem/path combinations	Per cent of problems with test[(b)]	Rate of path orders per 100 problems with pathology[(c)]
Lipid disorder	2,889	1,800	6.4	30.4	204.7
Hypertension*	8,560	1,752	6.2	8.6	237.1
Diabetes*	2,785	1,674	5.9	26.5	226.6
Weakness/tiredness general	702	1,196	4.2	48.8	348.9
Female genital check-up/ Pap smear*	1,448	1,116	3.9	69.3	111.1
General check-up *	1,610	1,070	3.8	28.1	236.6
Urinary tract infection*	1,534	968	3.4	53.8	117.3
Blood test NOS	198	463	1.6	78.3	299.2
Pregnancy*	795	461	1.6	34.1	170.1
Anaemia*	609	450	1.6	32.8	224.9
Sub-total	21,131	10,950	36.5	. .	. .
Total	**143,528**	**29,972**	**100.0**	**10.6**	**192.3**

(a) A test was counted more than once if it was ordered for the management of more than one problem at an encounter. There were 29,225 pathology test orders and 29,972 problem/pathology combinations.

(b) The percentage of contacts with the problem which generated at least one order for pathology.

(c) The rate of pathology orders placed per 100 contacts with that problem generating at least one order for pathology.

* Includes multiple ICPC–2 and ICPC–2 PLUS codes (see Appendix 3).

Note: Path—pathology order, NOS—not otherwise specified.

12.2 Imaging ordering

A comprehensive report on imaging orders by general practitioners in Australia in 1999–00 written by the GP Statistics and Classification Unit using Beach data was published by the AIHW in 2001 (Britt et al. 2001). Readers wishing a more detailed study of imaging orders should consult that publication and may wish to compare those results with the information presented below.

Table 12.4: The most frequent imaging tests ordered

Imaging test ordered	Number	Per cent of tests	Per cent of group	Rate per 100 encs	95% LCL	95% UCL
Diagnostic radiology	**4,779**	**62.6**	**100.0**	**4.8**	**4.6**	**5.1**
X-ray; chest	979	12.8	20.5	1.0	0.9	1.1
X-ray; knee	424	5.6	8.9	0.4	0.3	0.6
Mammography	354	4.6	7.4	0.4	0.2	0.5
X-ray; foot/feet	222	2.9	4.6	0.2	0.1	0.4
X-ray; hip	211	2.8	4.4	0.2	0.0	0.4
X-ray; shoulder	202	2.6	4.2	0.2	0.0	0.4
X-ray; ankle	190	2.5	4.0	0.2	0.0	0.4
X-ray; spine; lumbosacral	177	2.3	3.7	0.2	0.0	0.4
X-ray; spine; cervical	149	1.9	3.1	0.2	0.0	0.4
X-ray; wrist	144	1.9	3.0	0.1	0.0	0.4
X-ray; hand	132	1.7	2.8	0.1	0.0	0.4
Test; densiometry	123	1.6	2.6	0.1	0.0	0.4
X-ray; spine; lumbar	112	1.5	2.3	0.1	0.0	0.4
X-ray; abdomen	98	1.3	2.1	0.1	0.0	0.4
X-ray; finger(s)/thumb	97	1.3	2.0	0.1	0.0	0.3
X-ray; spine; thoracic	77	1.0	1.6	0.1	0.0	0.4
Scan; bone(s)	74	1.0	1.6	0.1	0.0	0.4
X-ray; elbow	73	1.0	1.5	0.1	0.0	0.4
Ultrasound	**2,104**	**27.6**	**100.0**	**2.1**	**2.0**	**2.3**
Ultrasound; pelvis	414	5.4	19.7	0.4	0.2	0.6
Ultrasound; abdomen	241	3.2	11.5	0.2	0.1	0.4
Ultrasound; breast	193	2.5	9.2	0.2	0.0	0.4
Ultrasound; shoulder	155	2.0	7.4	0.2	0.0	0.4
Ultrasound; obstetric	124	1.6	5.9	0.1	0.0	0.5
Ultrasound; renal tract	118	1.6	5.6	0.1	0.0	0.4
Test; Doppler	107	1.4	5.1	0.1	0.0	0.3
Ultrasound	99	1.3	4.7	0.1	0.0	0.5
Ultrasound; abdomen upper	84	1.1	4.0	0.1	0.0	0.3
Computerised tomography	**675**	**8.8**	**100.0**	**0.7**	**0.6**	**0.8**
CT scan; brain	121	1.6	18.0	0.1	0.0	0.3
CT scan; head	94	1.2	13.9	0.1	0.0	0.4
CT scan; spine; lumbosacral	78	1.0	11.6	0.1	0.0	0.4
Nuclear medicine imaging	**41**	**0.5**	**100.0**	**0.0**	**0.0**	**0.4**
Magnetic resonance imaging	**33**	**0.4**	**100.0**	**0.0**	**0.0**	**0.4**
Total imaging tests	**7,632**	**100.0**	**. .**	**7.7**	**7.3**	**8.0**

Note: Encs—encounters, LCL—lower confidence limit, UCL—upper confidence limit.

Nature of imaging orders at encounter

There were 7,632 orders for imaging and these were made at a rate of 7.7 per 100 encounters. At least one imaging test was ordered at 6.8% of encounters and for 4.8% of problems managed. The imaging tests recorded were grouped into one of five categories—Diagnostic radiology, Ultrasound, Computerised tomography, Nuclear medicine imaging and Magnetic resonance imaging (Appendix 8). Diagnostic radiology made up almost two thirds (62.6%) of all imaging tests, Ultrasound accounted for 27.6%, CT scanning 8.8%, Nuclear medicine 0.5% and MRI 0.4%.

Chest x-rays were by far the most common Diagnostic radiology (20.5%) while x-ray of the knee (8.9%) and mammography (7.4%) followed. Ultrasound was commonly of the pelvis (19.7%) abdomen (11.5%), or breast (9.2%). CT scans were most commonly performed on the brain (18.0%) or skull (13.9%) or on the lumbosacral spine (11.6%).

Overall the most frequently ordered imaging test was chest x-ray which accounted for 12.8% of all imaging and was ordered at a rate of 1.0 per 100 encounters. X-rays of the knee, the second most frequently ordered, accounted for 5.6% of all imaging tests and was ordered at a rate of 0.4 per 100 encounters (Table 12.4).

Problems associated with orders for imaging

Table 12.5 describes the problems for which an imaging test was most frequently ordered. They are presented in decreasing order of test frequency.

Table 12.5: The ten problems for which an imaging test was most frequently ordered

Problem managed	Number of problems	Number of problem/imaging combinations[(a)]	Per cent of problem/imaging combinations	Per cent of problems with test[(b)]	Rate of imaging orders per 100 tested problems[(c)]
Fracture*	1059	432	5.2	38.2	107.0
Back complaint*	2,568	402	4.8	13.9	112.7
Osteoarthritis*	2,499	370	4.5	13.3	111.6
Sprain/strain*	2,020	356	4.3	15.9	110.9
Abdominal pain*	590	183	2.2	29.2	106.2
Injury musculoskeletal NOS	677	168	2.0	22.6	109.5
Breast lump/mass (female)	168	161	1.9	66.8	143.5
Pain, chest NOS	256	134	1.6	41.6	125.7
Injury skin, other	655	132	1.6	17.8	113.1
Shoulder syndrome (incl. arthritis, osteoarthritis)	360	125	1.5	23.3	149.5
Subtotal	*10,852*	*2,463*	*29.6*	. .	. .
Total	**143,528**	**8,312**	**100.0**	**. .**	**. .**

(a) A test was counted more than once if it was ordered for the management of more than one problem at an encounter. There were 7,841 imaging test orders and 8,312 problem/imaging combinations.

(b) The percentage of contacts with the problem which generated at least one order for imaging.

(c) The rate of imaging orders placed per 100 contacts with that problem generating at least one order for imaging.

* Includes multiple ICPC–2 and ICPC–2 PLUS codes (see Appendix 3). *Note:* NOS–Not otherwise specified.

There were 8,312 problem-imaging combinations. Six (including the top four) of the ten most common problems were related to the musculoskeletal system. The remaining problems were related to abdominal, breast, skin and chest problems.

Fracture, the most common problem for which imaging was ordered, accounted for 5.2% of all imaging and over one-third (38.2%) of contacts with a fracture resulted in an imaging order. Back complaint accounted for almost the same proportion of imaging orders (4.8%). However, only 13.9% of contacts with this problem resulted in an order for imaging.

The ordering of multiple imaging for a single problem was much less common than the ordering of multiple pathology. Breast lump / mass (female) had the highest rate of multiple test orders in the top ten problems, 143.5 tests being ordered for every 100 problems.

12.3 Other investigations ordered

There were 596 orders for other investigations and these were made at a rate of 0.6 per 100 encounters. At least one other investigation was ordered at 0.6% of encounters and for 0.4% of problems managed. Electrocardiograms were by far the most common investigation (58.3%) (ordered at a rate of 0.4 per 100 encounters), and stress test (6.0%), spirometry (5.8%) and Holter monitoring (5.7%) followed (Table 12.6).

Table 12.6: Most frequent other tests ordered

Test ordered	Number	Per cent of tests	Rate per 100 encs	95% LCL	95% UCL
Electrocardiogram	347	58.3	0.4	0.1	0.6
Electrocardiogram; stress test	36	6.0	0.0	0.0	0.4
Test; spirometry	35	5.8	0.0	0.0	0.5
Holter monitor	34	5.7	0.0	0.0	0.4
Test; audiometry	20	3.4	0.0	0.0	1.0
Subtotal	*472*	*79.2*	. .	. .	. .
Total other tests	**596**	**100.0**	**0.6**	**0.4**	**0.8**

Note: Encs—encounters, LCL—lower confidence limit, UCL—upper confidence limit.

Problems associated with orders for other tests

Table 12.7 describes the problems most commonly under management when other investigations were ordered. They are presented in decreasing order of frequency of problem / test combinations. There were 608 problems to which other investigations were linked. Six of the ten most common problems were related to the cardiovascular system. The remaining problems were related to chest and psychological problems.

Chest pain, the most common problem for which other investigations were ordered, accounted for 10.7% of all tests. Nearly a quarter of contacts with this problem resulted in an investigation in this group. Ischaemic heart disease accounted for the almost the same proportion of test orders but only 3.8% of contacts with ischaemic heart disease resulted in a test order.

The ordering of multiple imaging for a single problem was very uncommon compared with the ordering of multiple pathology. Palpitations had the highest rate of multiple test orders in the top 10 problems, 114.2 tests being ordered for every 100 problems.

Table 12.7: The ten problems managed for which other tests were most frequently ordered

Problem managed	Number of problems	Number of problem/test combinations[(a)]	Per cent of problem/test combinations	Per cent of problems with test[(b)]	Rate of test orders per 100 tested problems[(c)]
Pain, chest NOS	256	65	10.7	24.3	104.5
Ischaemic heart disease*	1,279	49	8.0	3.8	100.0
General check-up*	1,610	42	6.9	2.4	107.7
Hypertension*	8,560	40	6.6	0.5	103.9
Palpitations/awareness of heart	121	23	3.9	16.9	114.2
Cardiac arrhythmia NOS	131	21	3.5	16.2	100.0
Chest symptom/complaint	188	21	3.5	11.2	100.0
Asthma	2,821	20	3.3	0.7	100.0
Atrial fibrillation/flutter	571	19	3.2	3.4	100.0
Anxiety*	1,645	16	2.6	0.9	110.6
Subtotal	*17,182*	*317*	*52.1*	. .	. .
Total	**143,528**	**608**	**100.0**	**. .**	**. .**

(a) A test was counted more than once if it was ordered for the management of more than one problem at an encounter. There were 596 other test orders and 608 problem/imaging combinations.

(b) The percentage of contacts with the problem which generated at least one order for other tests.

(c) The rate of other test orders placed per 100 contacts with that problem generating at least one order for other tests.

* Includes multiple ICPC–2 and ICPC–2 PLUS codes (see Appendix 3).

Note: NOS–Not otherwise specified

13 Patient risk factors

13.1 Background

General practice is commonly identified as a significant intervention point for health care and health promotion because general practitioners have considerable exposure to the health of the population. As about 80% of the population visit a GP in any one year (Commonwealth Department of Health and Aged Care (DHAC) 1996), general practice appears to provide a suitable basis from which to monitor many aspects of the health of the population.

Since BEACH began in April 1998 a section on the bottom of each encounter form has been allocated to investigate aspects of patient health or health care delivery not covered by general practice consultation-based information. These additional substudies are referred to as the SAND (Supplementary Analysis of Nominated Data). Each organisation supporting the BEACH program has access to a subsample of 6,000 encounter forms per year in which to insert a series of questions (or two sets of questions in two smaller samples) on a subject of their choice as the SAND questions.

13.2 Methods

The third annual BEACH data collection period was divided into ten blocks of 5 weeks. Each block included data from 100 GPs with 20 GPs recording per week. The recording pads of 100 forms were divided into three sections (40 A forms, 30 B forms and 30 C forms. Form A topic remained constant over the ten blocks, while Form B and Form C topics changed from block to block. The order of SAND sections in the GP recording pack is randomised, so that the 40 A forms may appear first, second or third in the pad. Randomised ordering of the components ensures that there is no order effect on the quality of the information collected.

The Form A topics contain questions about population risk factors including patient reported height and weight (for calculation of body mass index, BMI), alcohol use and smoking status. Patient self assessed wellbeing, collected and reported in the first 2 years of the BEACH study, was not collected in the current year.

The population risk factor questions for alcohol consumption, BMI and smoking status will remain constant in future years and these are now included in each annual report. Summaries of results for other topics covered in SAND are available to the general public on the FMRC web site www.fmrc.org.au\beach.htm.

13.3 Body mass index

The body mass index (BMI) for an individual is calculated by dividing weight (kilograms) by height (metres) squared. A person with a BMI that is less than 20 is considered underweight, 20–24 is normal, 25–29 overweight and more than 30 is considered to be obese.

The GPs were instructed to ask the patients (or their carer in the case of children):

- What is your height in centimetres?
- What is your weight in kilograms?

Metric conversion tables (feet and inches; stones and pounds) were provided to the GP.

There is considerable debate in the literature as to whether the standard BMI calculation described above is appropriate in the case of children. Cole et al. (2000) have developed a method which calculates age- and sex-specific BMI cut-off levels for overweight and obesity which are specific to children. The BEACH data on BMI is therefore presented separately for adults (aged 18 or over) and children. The standard BMI cut-offs have been applied for the adult population whereas the method described by Cole et al. (2000) has been used to calculate BMI cut-off levels for defining overweight and obesity in children aged between 2 and 18 years. This method is based on international data from developed Western cultures, and is therefore applicable within the Australian setting.

Body mass index of adult patients

BMI was calculated for 31,957 patients aged 18 years and over at encounters with 997 GPs. Overall, 20.2% (95% CI: 19.5–20.8) of these encounters were with patients considered obese, and 34.1% (95% CI: 33.4–34.7) were with those graded as overweight. A further 8.0% were with underweight patients and 37.8% were with patients whose BMI was in the normal range.

A greater proportion of males were overweight or obese (60.2%) than females (50.2%). The proportion of patients considered overweight or obese was greatest for males aged 45–64 years (Figure 13.1). These results are consistent with those of the 1995 National Nutrition Survey which estimated 64% of adult males and 49% of adult females were overweight or obese at that time (AIHW) 2000**.**

The patient was considered underweight at 8.0% (95% CI: 7.6–8.4) of adult encounters. In the 18–24 years age group, 21.6% of women and 10.9% of men were considered underweight, as were 14.0% of women and 6.4% of men in the 75 years and over age group (Figure 13.2). These estimates are almost four times those made from the general population in 1995 (underweight measured as BMI < 18.5) when only 3% of women and 1% of men were considered underweight and the prevalence in the 18–24 age group for females was about 6%.

In accepted clinical practice, GPs use a cut-off of BMI < 20 rather than < 18.5. to define ‘underweight’. The use of different underweight cut-off points between the two studies could account for the large difference between the BEACH results and those of the National Nutrition Survey. The BEACH data was therefore recalculated using the < 18.5 cut off The results were far more comparable to those from the Nutrition Survey, with 1.6% of adult males, 3.8% of adult females, and 8.1% of females aged 18–24 years, being underweight.

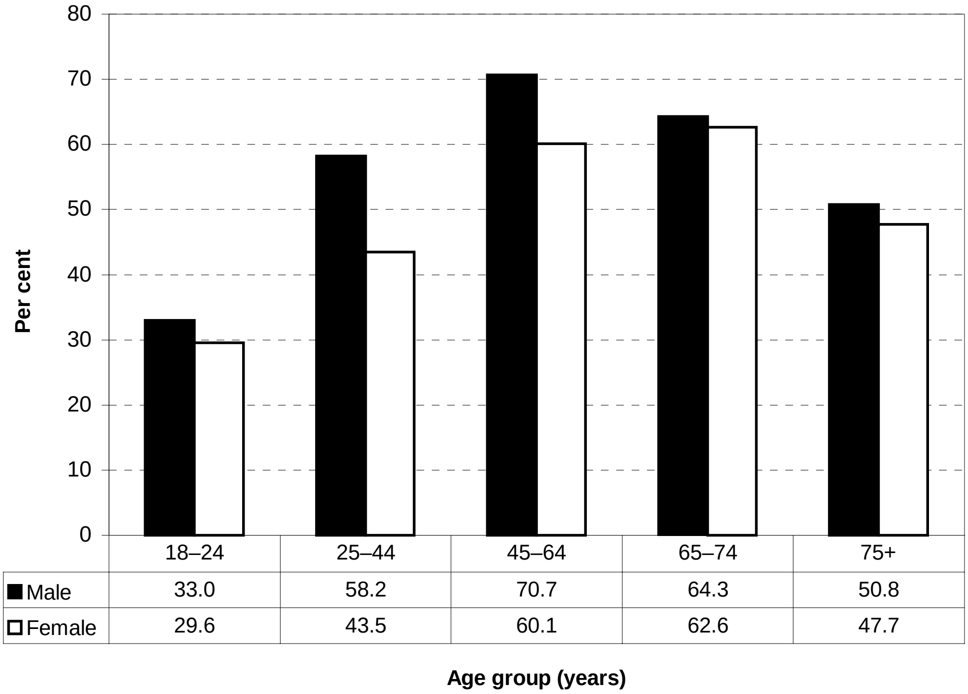


Figure 13.1: Age–sex-specific rates of overweight and obesity in adults

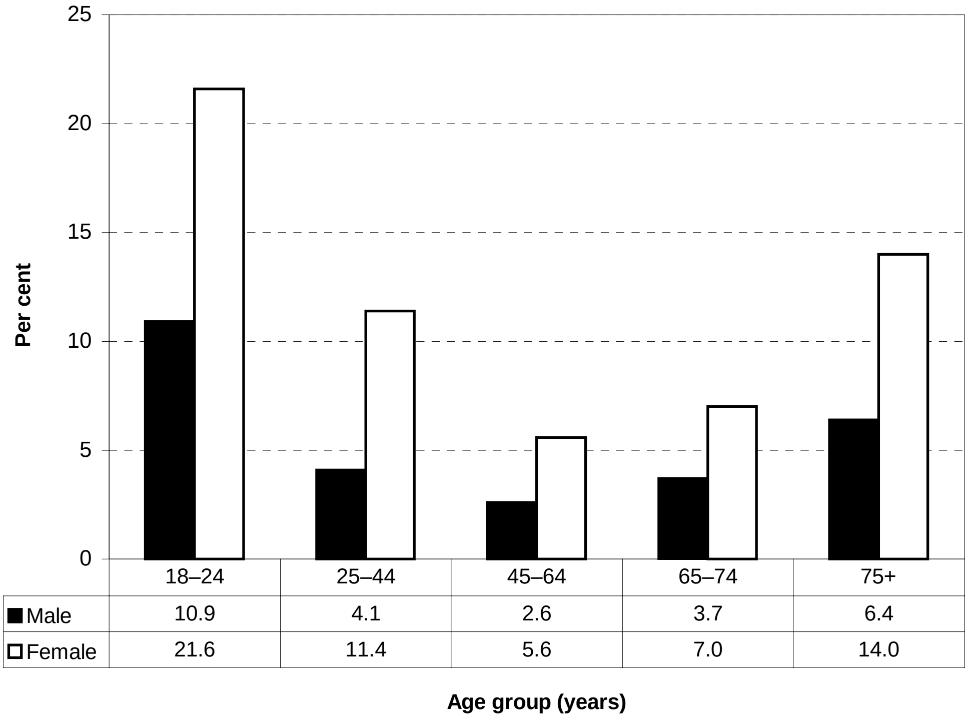


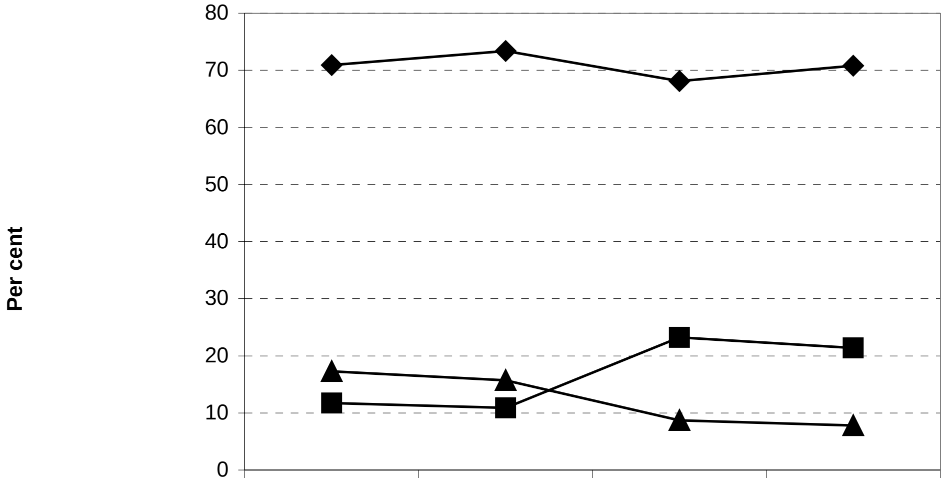
Figure 13.2: Age–sex-specific rates of underweight in adults

Body mass index of children attending general practice

BMI was calculated for 4,465 patients aged between 2 and 18 years at encounters with 911 GPs. Overall 11.7% (95% CI: 9.2–14.1) of these encounters were with children considered obese, and a further 15.3% (95% CI: 13.8–16.8) were with children defined as overweight. Of male children, 29.0% (95% CI: 26.0–32.0) were considered to be overweight or obese, compared with 25.5% (95% CI: 22.7–28.3) of female children.

Children aged 9–12 years were the most likely to be overweight or obese and this applied to both males (31.9%) and females (29.1%). In the adolescent age group (13–17 years) the rates of overweight and obesity were lower in both male (29.2%) and female (21.1%) patient groups, but the difference was more pronounced in the female population (Figures 13.3 and 13.4).

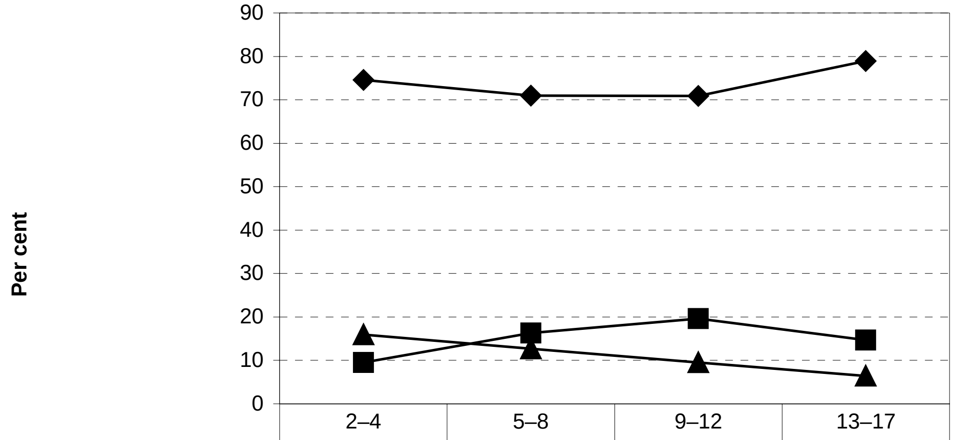
Now that this statistically rigorous and reliable method of defining overweight and obesity in children is being employed, it is anticipated that these figures for children will be a useful baseline for future comparisons.



	2–4	5–8	9–12	13–17
Male under/normal	70.9	73.4	68.1	70.8
Male overweight	11.7	10.9	23.2	21.4
Male obese	17.3	15.7	8.7	7.8

Age group (years)

Figure 13.3: BMI in children—male age-specific rates



	2–4	5–8	9–12	13–17
Female under/normal	74.6	71.0	70.9	78.9
Female overweight	9.5	16.3	19.6	14.7
Female obese	15.9	12.7	9.5	6.4

Age group (years)

Figure 13.4: BMI in children—female age-specific rates

13.4 Smoking

The National Drug Strategy Household Survey estimated that 22% of the population aged 14 years and over are regular smokers, comprising 25% of Australian men and 20% of Australian women (AIHW 1999).

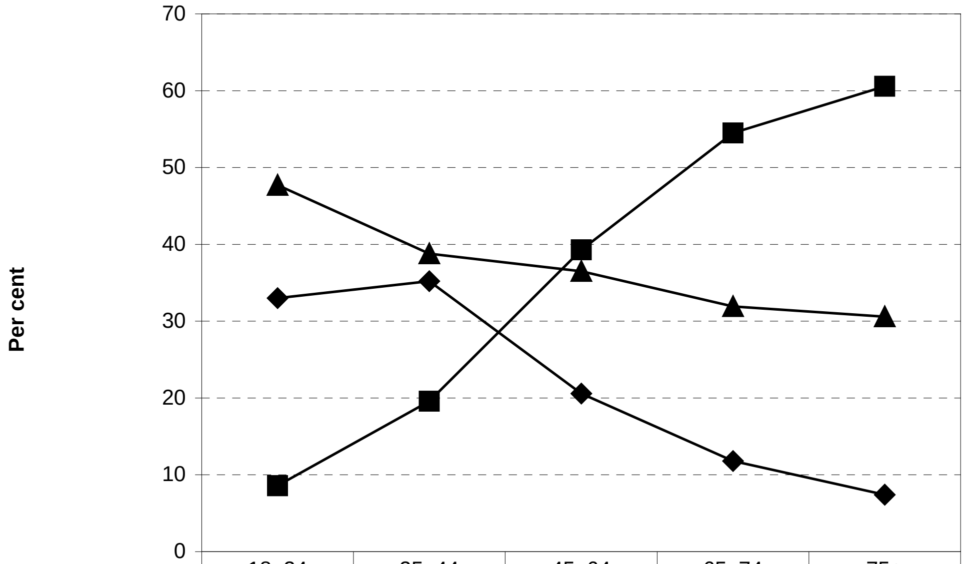
As part of the current study, the GPs were instructed to ask the patients (18+ years):

- What best describes your smoking status? Smoke daily; Occasional smoker; Previous smoker; Never smoked

Respondents were limited to adults aged 18 years and over as the reliability of information on smoking and alcohol consumption from patients aged 14–17 may be compromised if a parent is present at the consultation. There may also be ethical concerns about approaching this younger patient group to ask this information for survey purposes.

The smoking status of 32,124 adult patients aged 18 years and over was ascertained from encounters with 998 GPs. Overall, 19.3% (95% CI: 18.5–20.1) of patient encounters were with adults who were daily smokers, 4.4% (95% CI: 3.9–4.8) were with occasional smokers and 27.3% (95% CI: 26.5–28.0) were with previous smokers. A greater proportion of males (22.6%) than females (17.1%) were daily smokers. As shown in previous BEACH reports, the proportion of smokers decreased with age. Only 7.4% of male and 5.1% of female patients aged 75 years and over were daily smokers (Figures 13.5 and 13.6); however, 57% of males and 24% of females aged 65 years or more were previous smokers.

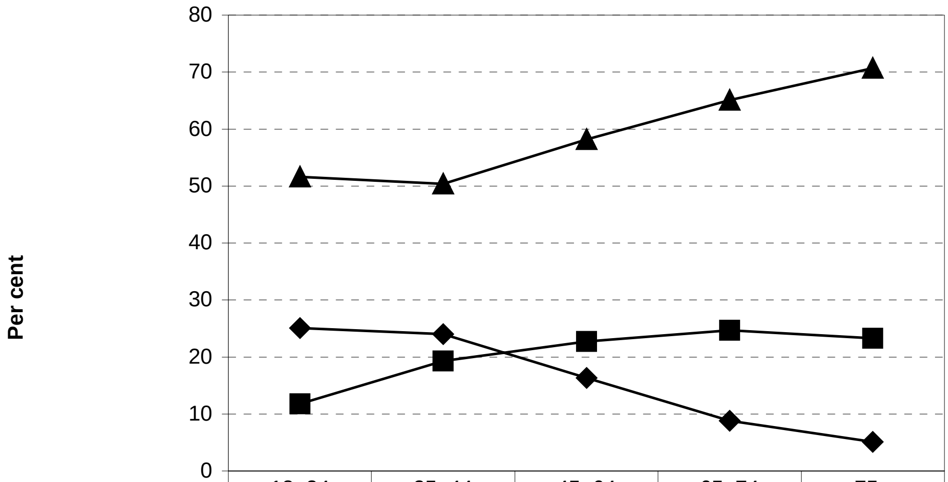
It is of some concern that currently about one in three young male and one in four young female patients are daily smokers, even after the considerable efforts made over the last decade to effect a decreased uptake of smoking.



	18–24	25–44	45–64	65–74	75+
Male daily	33.0	35.2	20.6	11.8	7.4
Male previous	8.6	19.6	39.3	54.5	60.6
Male never	47.7	38.8	36.5	31.9	30.6

Age group (years)

Figure 13.5: Smoking status—male age-specific rates



	18–24	25–44	45–64	65–74	75+
Female daily	25.1	24.0	16.3	8.8	5.1
Female previous	11.8	19.3	22.7	24.7	23.3
Female never	51.6	50.4	58.2	65.1	70.7

Age group (years)

Figure 13.6: Smoking status—female age-specific rates

13.5 Alcohol use

Alcohol use is the second leading cause of drug-related death in Australia after tobacco. National Health Priority Areas recognises alcohol as an important modifiable cause of premature death and disability in Australia (AIHW 2000). In 1993 Mattick and Jarvis estimated that of those people who consumed alcohol at all, 44% of males and 30% of females were drinking regularly to excessive levels (Mattick & Jarvis 1993). The 1998 National Drug Strategy Household Survey (NDSHS) estimated that between 7% and 16% of adult males, and between 4% and 10% of adult females, were drinking at hazardous or harmful levels. The latter figures are somewhat lower than the estimates from the 1995 ABS National Health Survey, of 15% for males and 13% for females (Mathers et al. 1999:109).

To measure alcohol consumption, BEACH uses three items from the WHO Alcohol Use Disorders Identification Test (AUDIT) (Saunders et al. 1993), with slightly modified wording and scoring for an Australian setting (Centre for Drug and Alcohol Studies 1993). Together these three questions assess ‘at-risk’ alcohol use. The scores for each question range from 0 to 4. A score of 5+ for males or 4+ for females suggests that the person’s drinking level is placing them at-risk.

GPs were instructed to ask the patient (18+ years):

- How often do you have a drink containing alcohol?
  Never
  Monthly or less
  Once a week
  2–4 times a week
  5+ times a week
- How many standard drinks do you have on a typical day when you are drinking? ____________
- How often do you have 6 or more standard drinks on one occasion?
  Never
  Monthly or less
  Once a week
  2–4 times a week
  5+ times a week

A standard drinks chart was provided to each GP to help the patient identify the number of standard drinks consumed.

Responses to these questions were recorded at 31,543 patient encounters (18+ years) from 998 GPs.

Overall, 24.1% (95% CI: 23.3–24.9) of patient encounters were with adults who reported drinking ‘at-risk’ levels of alcohol. The proportion of at-risk drinkers was higher for male patients (30.3%, 95% CI: 29.2–31.4) than for female patients (19.9%, 95% CI: 19.1–20.8). The proportion of patients who were at-risk drinkers decreased with age for both males and females (Figure 13.7). These estimates are far higher than those made from the NDCHS and the 1995 ABS National Health Survey. If any conclusions are to be drawn about reasons for these differences in results, more detailed comparison of results will be required, with statistical adjustment for differences between the three studies, particularly in the age and gender distribution of respondents.

The proportion of adult male drinkers who were drinking at-risk levels of alcohol was estimated to be 38.6%. The corresponding figure for women was 31.4%. These estimates are similar to those of Mattick in 1993, though a little lower for males and a little higher for females (Mattick & Jarvis 1993).

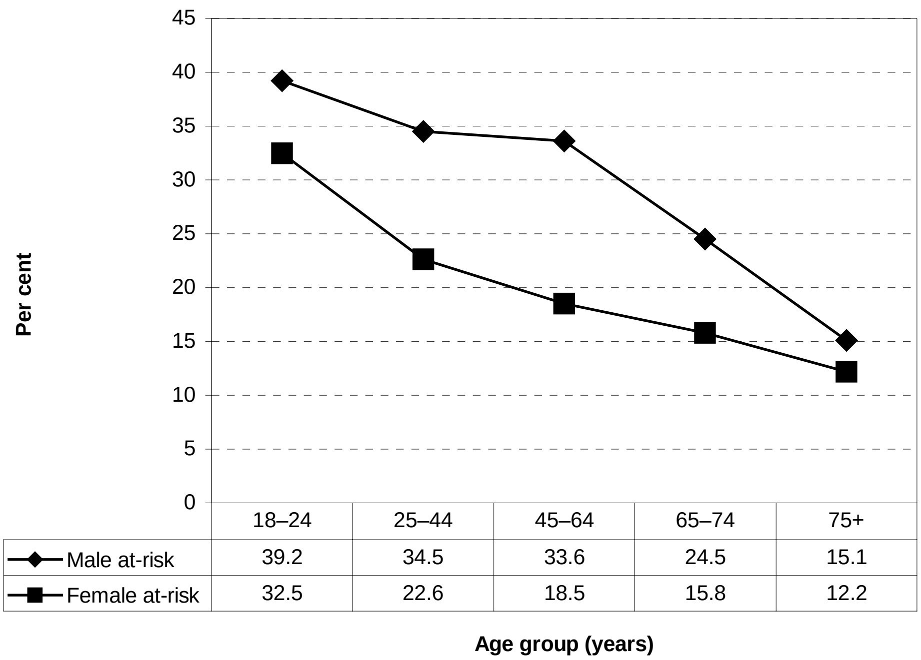


Figure 13.7: Age–sex-specific rates for at-risk alcohol use

13.6 Changes in patient health risk factors over the years 1998–99, 1999–00 and 2000–01

The proportion of adults attending general practice who were consuming at-risk levels of alcohol, and the proportion who said they were daily smokers showed no significant change with time over the first 3 years of the BEACH program. However, the proportion of adults who were classified as obese and the proportion classified as overweight according to their self-reported height and weight, showed a significant increase over the three years. The proportion classed as obese rose from 18.4% in 1998–99 to 20.2% in 2000–01 ($p < 0.0001$) and the proportion classed as overweight, from 32.8% to 34.1% ($p = 0.0039$).

Table 13.1: Comparative results for patient risk factors, 1998–99 to 2000–01

	BEACH 1998–99		BEACH 1999–00		BEACH 2000–01	
Risk factor	**Per cent**	**95% CI**	**Per cent**	**95% CI**	**Per cent**	**95% CI**
Obese	18.4	17.7–18.9	19.4	18.8–20.0	20.2	19.5–20.8
Overweight	32.8	32.1–33.4	33.1	32.5–33.8	34.1	33.4–34.7
Current daily smoker	19.2	18.4–20.0	18.9	18.2–19.6	19.3	18.5–20.1
At-risk alcohol level	24.5	23.6–25.3	24.2	23.4–24.9	24.1	23.3–24.9

14 Selected topics—changes over time

In Chapter 7 (Section 7.3) changes in the relative rates of management of common problems were reported. In Chapter 9 (Section 9.5) changes in medication rates for some selected medication groups of interest were also reported.

In this chapter, multiple linear regression is used to investigate changes in medication management of selected topics over time. The purpose was to examine more closely how observed changes in management rates of particular problems and changes in medication rates were reflected in medication management for particular problems of interest. This is the first opportunity to undertake these time trends analyses with BEACH data, as this year of the program has provided the third measurement point.

Topic selection was based on:

- medications or problems of topical interest in terms of public health initiatives or recent developments in treatments.
- whether there were significant changes in overall rates of management of a problem or in overall rates prescription of a medication as described in Chapter 7, (Section 7.3) and Chapter 9 (Section 9.5).

Using these criteria, four topics were selected for examination of management over time:

- medication rates for depression, in particular the rates of management with selective serotonin reuptake inhibitors (SSRIs) versus other anti-depressants.
- medication rates for lipid disorders over time, in particular the rates of management with HMG CoA reductase inhibitors (statins).
- medication rates for asthma over time, in particular asthma preventives versus bronchodilators.
- the use of non-steroidal anti-inflammatory drugs (NSAIDs) to manage all arthritis (including osteoarthritis and rheumatoid arthritis) versus other musculoskeletal problems.

14.1 Method

Multiple linear regression was used to predict changes in selected medication rates over time after adjusting for the main problems of interest related to that medication. By adjusting for the problem of interest, it is possible to test whether:

- there has been a change over time in the medication management of the problem of interest (e.g. Was there an increase over the 3 years in the overall prescribing rate of anti-depressants for depression?) *or*
- the observed change in medication rate is explained by a commensurate change in rates of management of the problems for which this medication is prescribed. This would mean there had been no change in medication management for that problem over the 3-year period, and that the observed change in medication rate was due to the change in management rates of the selected problem(s).

The outcome variable for each multiple regression model was medication rate (per 100 problem contacts). The predictors were problem managed and time. Patient age and sex were included as potential confounders of the effect of time and problem on medication rates.

'Time × problem' interaction terms were entered into the multiple regression models to test whether changes in medication rates over time differed for specific problems of interest. For example, for NSAIDs, two interaction terms, 'time × arthritis' and 'time × other musculoskeletal problems' were created to test whether changes in NSAID rates over time were uniform across all musculoskeletal problems, or whether the trends were more pronounced for the management of arthritic problems.

14.2 Anti-depressant medications and management of psychological problems over time

Before presenting trends in the prescribing of anti-depressant medications for psychological problems, the following section provides an overview of the rates of management of depression, the patients who are treated for depression and the current techniques adopted by GPs in its management during the third year of the BEACH program.

Depression management in 2000–01

A problem was classified as 'depression' if the GP recorded it in the diagnosis / problem section of the form as either: a complaint, such as 'feeling depressed', which included more specific labels of feeling sad, lonely, unhappy, worried or having low self-esteem (ICPC–2 rubric P03); or in diagnostic terms such as a depressive disorder, which included more specific labels of depressive neurosis, postnatal or reactive depression, or anxiety with depression (ICPC–2 rubric P76).

Depression was the fourth most common problem managed in general practice. It presented on 3,624 occasions (at a rate of 3.6 per 100 encounters), accounting for 2.5% of all problems managed. A simple extrapolation based on approximately 103 million Medicare-claimed general practice consultations would suggest there are approximately 3.6 million encounters per year in which GPs manage depression.

Figure 14.1 illustrates the relationship of depression with other variables about which information is collected. Depression can be directly linked to patient characteristics such as age and sex, treatments provided, prescriptions written, tests and investigations ordered, and referrals transcribed (solid arrows). Depression can also be indirectly related to patient RFEs (dotted arrow). In addition, other problems that were managed at a 'depression encounter' have been included to give an indication of co-morbidities managed with depression.

Age and sex distribution of patients

Patients managed for depression were more likely to be female (67.6%). The majority of patients (72.4%) were aged between 25 and 64 years. Comparisons with the age and sex demographics for total encounters (females 57.1%) suggest that female patients were over-represented at depression encounters. Young patients of 24 years or less accounted for only 8.8% of those encounters at which depression was managed compared with 24.6% of all encounters. In contrast, patients aged 25–44 years (37.9%) and those aged 45–64 years

(34.5%) were over-represented in this sub-group when compared with the total sample (26.3% and 26.1% respectively).

Reasons for encounter

At the 3,623 encounters where depression was managed, 6,447 patient RFEs were described (178 per 100 depression encounters), somewhat more than in the total data set (151 per 100 total encounters). For over half of these encounters, the patients described a reason for the encounter as depression (52.4 per 100 depression encounters). Requests for medication (not necessarily for depression) were also a frequent RFE, presenting at a rate of 15.4 per 100 depression encounters. Other RFEs included anxiety (5.5 per 100 depression encounters), sleep disturbance (5.2 per 100) and weakness/tiredness (4.4 per 100). Miscellaneous preventive procedures such as a general or cardiovascular check-up, back complaints and hypertension were also noted.

Other problems managed

At each encounter where depression was managed, a number of other problems may have been managed. Overall, a total of 3,233 other problems were managed by the GP at encounters at which depression was managed. The most common co-morbidities managed with depression were similar to the commonly reported problems in the total data set. There were, however, some differences intheir relative frequency. Most co-morbidities managed at depression encounters were chronic conditions such as hypertension (8.3 per 100 depression encounters), diabetes (2.4), back complaints (2.3), lipid disorder (2.1) and osteoarthritis (2.1). Anxiety (1.8) and sleep disturbance (1.6) were the only other psychological problems commonly managed with depression.

Prescriptions and other treatments

Medications were prescribed for depression at a rate of 78 per 100 depression contacts, a somewhat higher rate than in the total data set (63.9 per 100 problems). Of the 2,842 medications prescribed for depression, selective serotonin uptake inhibitors (SSRIs) such as sertraline, paroxetine, citalopram, fluoxetine hydrochloride, and the seratonin and noradrenalin reuptake medication venlafaxine, were the most frequently prescribed, followed by the more traditionally used tricyclic anti-depressants (dothiepin).

Counselling was by far the most common form of non-pharmacological management, undertaken at a rate of 40.8 per 100 depression encounters. Note that this compares with an overall use of psychological counselling of only 2.5 per 100 encounters in the total data set. Other forms of counselling, advice and reassurance were also common. The relative rate of provision of psychological counselling for depression was signficantly higher (40.8 per 100 contacts with depression) than the rate reported in 1998–99 (34.2%) (Britt et al. 1999c).

Tests, investigations and referrals

Overall, rates of pathology orders for encounters where depression was managed (8.7 per 100 depression encounters) were far below those for the total data set (29.4 per 100 total encounters). Chemistry (e.g. urine analysis) and haematological (e.g. full blood counts) investigations were the most common pathology tests ordered for depression at the relatively low rates of 6.0 and 2.2 per 100 depression encounters respectively.

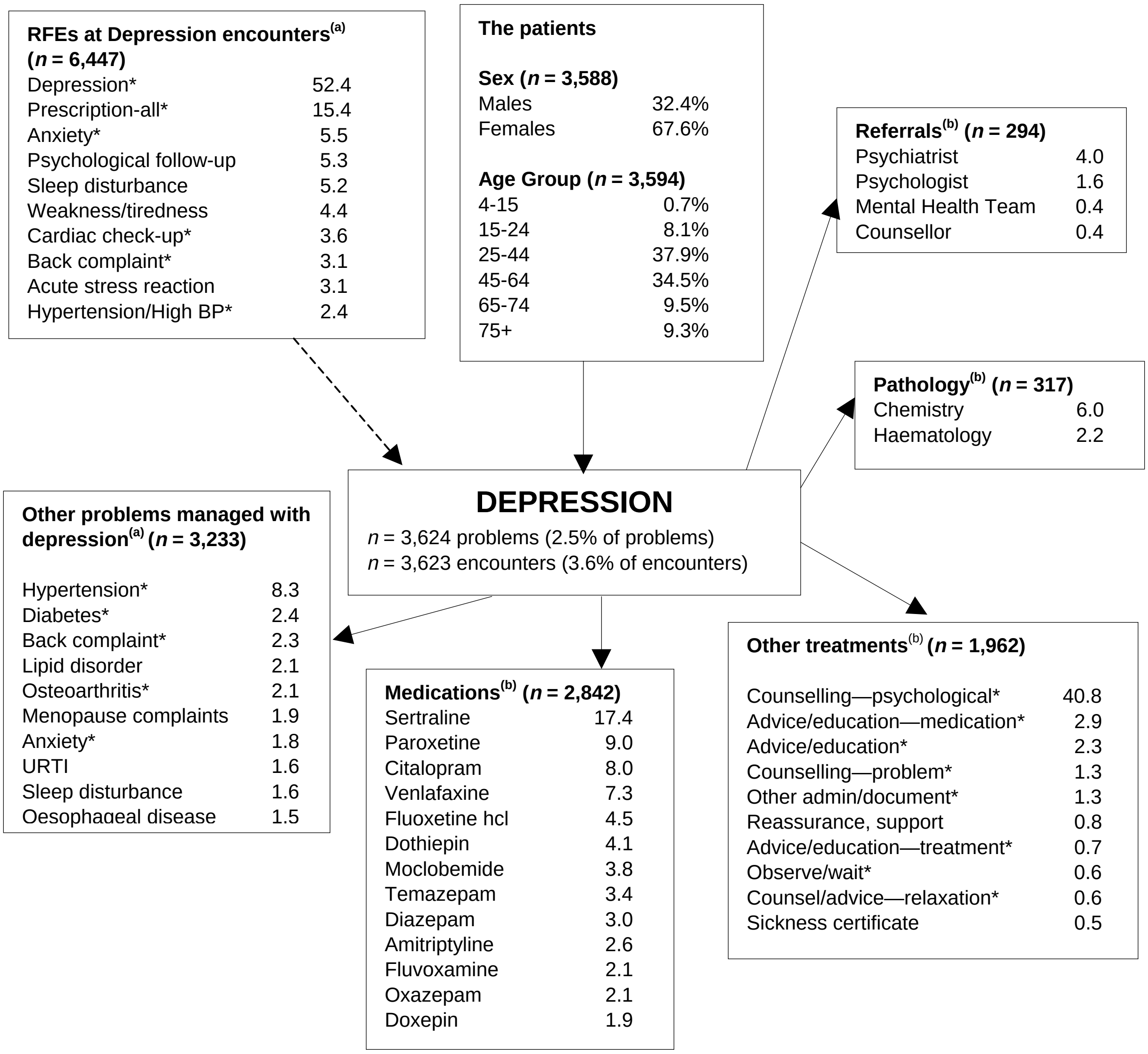


Figure 14.1: Management of depression in 2000–01

(a) Expressed as rates per 100 encounters at which depression was managed (*n* = 7,485).

(b) Expressed as rates per 100 problems at which depression was managed (*n* = 7,527).

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendices 3–9).

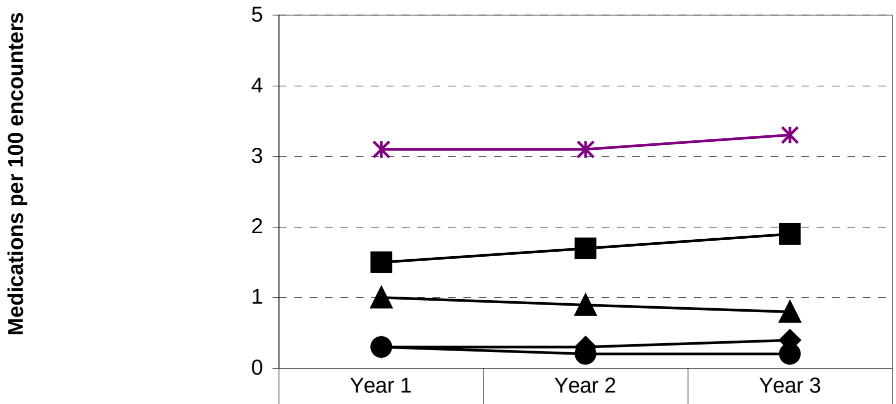
Total referrals for depression (8.1 per 100 depression encounters) were less frequent than those for the total data set (10.7 per 100 total encounters). Referrals to psychiatrists were made at a rate of 4.0 per 100 depression encounters and this was over ten times that seen in the total data set (0.3 per 100 total problem encounters). This reflects the finding that depression was the problem third most likely to be referred to any specialist (see Table 11.3). Referrals to an allied health service included referrals to psychologists, counsellors, and mental health teams.

Overall, the relative rate of depression managed in general practice and the techniques used by the GPs in its management are very similar to those in the first year of the BEACH program. The one exception was the increase, by almost 20%, in the rate of psychological counselling.

Changes over time

'All anti-depressant medications' included the ATC medication group N06A. This was subdivided into SSRIs (ATC code N06AB), non-selective monoamine re-uptake inhibitors (tricyclics, ATC code N06AA) and monoamine oxidase inhibitors (MAOIs, ATC codes N06AG, N06AF). Prescribing rates of anti-depressant medications were compared for depression versus all other psychological problems.

Figure 14.2 shows the overall rates of selected anti-depressant medications per 100 encounters, unadjusted for problem. As discussed in Chapter 9, Section 9.5, the relative prescribing rate of all anti-depressants per 100 encounters did not change over the 3-year period, but the prescribing rate of SSRIs rose significantly while the rate of prescribing of tricyclics and MAOIs decreased significantly.



	Year 1	Year 2	Year 3
SSRIs (a)	1.5	1.7	1.9
Tricyclics (b)	1.0	0.9	0.8
MAOIs (c)	0.3	0.2	0.2
Other(d)	0.3	0.3	0.4
All antidepressants (e)	3.1	3.1	3.3

BEACH data year

Figure 14.2: Prescribing rates of antidepressant medications over time

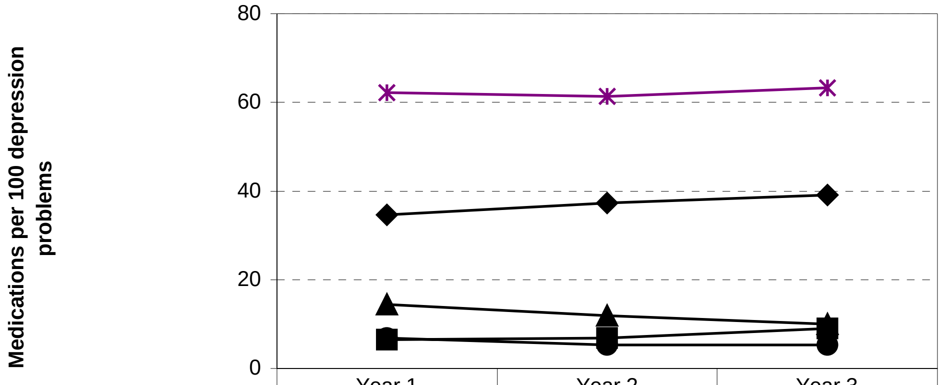
(a) Selective serotonin reuptake inhibitors, ATC code N06AB.

(b) Non-selective monoamine reuptake inhibitors, ATC code N06AA.

(c) Monoamine oxidase inhibitors, ATC code N06AG, N06AF.

(d) Other anti-depressants, ATC code N06AX.

(e) All anti-depressants ATC code N06A.



	Year 1	Year 2	Year 3
SSRIs (a)	34.7	37.3	39.1
Tricyclics (b)	14.4	11.9	10.0
MAOIs (c)	6.9	5.3	5.3
Other(d)	6.5	6.8	9
All antidepressants (e)	62.2	61.4	63.3

BEACH data year

Figure 14.3: Prescribing rates of anti-depressant medications for depression over time

(a) Selective serotonin reuptake inhibitors, ATC code N06AB.

(b) Non-selective monoamine reuptake inhibitors, ATC code N06AA.

(c) Monoamine oxidase inhibitors, ATC code N06AG, N06AF.

(d) Other anti-depressants, ATC code N06AX.

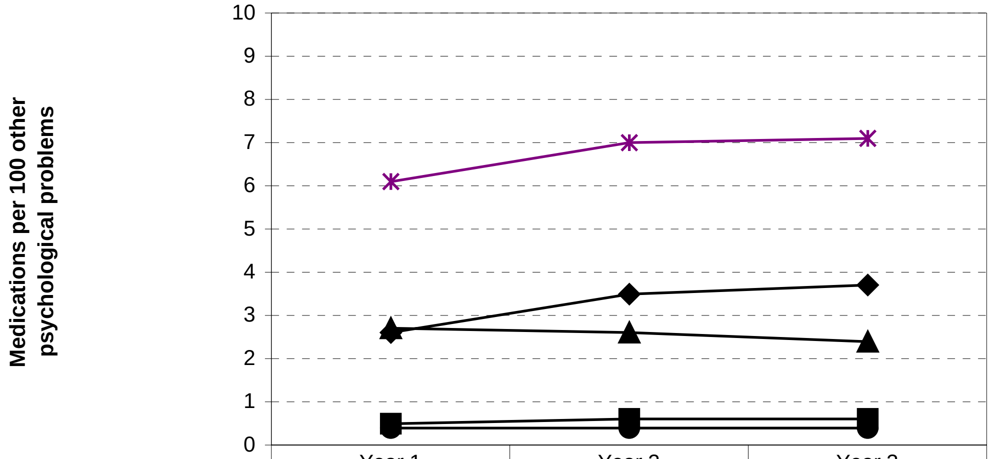
(e) All anti-depressants ATC code N06A.

Depression

Figure 14.3 shows the medication rates of anti-depressants specifically prescribed for depression. The rate of all anti-depressant prescribing for depression did not change over the 3 years, but the prescribing rate of SSRIs for depression increased significantly from 34.7 medications per 100 depression contacts in 1998–99 to 39.1 per 100 depression contacts in 2000–01. This was offset by a decrease over the period in the prescribing rate of tricyclic anti-depressants and monoamine oxidase inhibitors. There was also an increase in the prescribing rate of 'other' anti-depressants (including venlafaxine) (ATC code N06AX) from 6.5 medications per 100 depression problems in 1998–99 to 9.0 per 100 in 2000–01, largely explained by an increase in the prescribing rate of venlafaxine (3.7 medications per 100 depression problems in 1998–99 to 7.3 per 100 in 2000–01). The pattern of results indicates that there was no overall increase in medication rates for depression managed in general practice over the 3 years of the study, but that SSRIs were being substituted for older classes of anti-depressants during the period.

Other psychological problems

Figure 14.4 shows the prescribing rates over time of anti-depressant medications for all psychological problems other than depression. There was an increase in the rate of anti-depressants as a group for other psychological problems. This increase was explained by an increase in the prescribing rate of SSRIs for other psychological problems.



	Year 1	Year 2	Year 3
SSRIs (a)	2.6	3.5	3.7
Tricyclics (b)	2.7	2.6	2.4
MAOIs (c)	0.4	0.4	0.4
Other (d)	0.5	0.6	0.6
All antidepressants (e)	6.1	7.0	7.1

BEACH data year

Figure 14.4: Prescrbing rates of anti-depressant medications for other psychological problems over time

(a) Selective serotonin reuptake inhibitors, ATC code N06AB.

(b) Non-selective monoamine reuptake inhibitors, ATC code N06AA.

(c) Monoamine oxidase inhibitors, ATC code N06AG, N06AF.

(d) Other anti-depressants, ATC code N06AX.

(e) All anti-depressants ATC code N06A.

Multiple linear regression

All anti-depressants

Multiple linear regression was performed to ascertain whether the patterns of anti-depressant prescribing rate for depression and for other psychological problems had changed over the period 1998–99 to 2000–01.

Multiple regression with the prescribing rate of all anti-depressants as the outcome confirmed that after adjusting for depression and all other psychological problems the prescribing rate of all anti-depressants had not changed significantly over time (time adjusted for problem, $p = 0.43$). The observed increase in anti-depressant medication for other psychological problems (Figure 14.4) did not affect the overall trend in prescribing rate of anti-depressants, since the majority of anti-depressants were prescribed for depression.

SSRIs

Multiple regression with the prescribing rate of SSRIs as the outcome confirmed that the prescribing rate of SSRI medications for depression had risen, as had the rate of SSRI medications for all other psychological problems. However, a significant time × problem interaction term indicated that the increase in the SSRI prescribing rate was more marked for depression compared with other psychological problems (time × problem interaction, $p < 0.001$).

Conclusion

In spite of increasing professional and public programs about depression, there has been no significant increase in the overall number of encounters with depression in general practice. The rate of specific psychological counselling for the management of depression problems increased from 34.2 per 100 depression problems managed to 40.8 per 100 problems.

Overall rates of anti-depressant medication remained steady over the 3 years. There was no overall increase in anti-depressant medications prescribed specifically for depression, but there is evidence that during the 3-year period SSRIs were increasingly substituted for older classes of anti-depressant medication. There was also an increase in the relative prescribing rate of SSRIs for other psychological problems.

Selective serotonin re-uptake inhibitors (SSRIs) have significant advantages over the older anti-depressants such as tricyclics and MAOIs. The major advantage is the lower rate of side effects from this group of drugs. SSRIs are therefore the pharmacological treatment of first choice by Australian psychiatrists in virtually all forms of depression (Hickie et al. 1999). Studies by the SPHERE program indicate that older anti-depressants are still widely used in Australian general practice (Hickie & Marks 2001). This study demonstrates significant substitution of SSRIs and venlafaxine for tricyclic anti-depressants in line with accepted clinical practice.

14.3 Lipid-lowering agents and management of lipid disorders over time

Management of lipid problems in 2000–01

A problem was classified as a lipid disorder if the GP recorded it in the diagnosis / problem section of the form in terms such as high cholesterol, hypercholesterolaemia, hyperlipidaemia, hypertriglyceridaemia or raised lipids (ICPC–2 rubric T93).

Lipid disorder was the fifth most common problem managed in general practice. It was recorded on 2,889 occasions (at a rate of 2.9 per 100 encounters), accounting for 2.0% of all problems managed. A simple extrapolation based on approximately 103 million Medicare-claimed general practice consultations would suggest there are approximately 3 million encounters per year in which GPs manage lipid disorders.

Figure 14.5 illustrates the relationship of lipid disorder with other variables that are collected at the general practice encounter. Lipid disorder can be directly linked to patient characteristics such as age and sex, treatments provided, prescriptions written, tests and investigations ordered, and referrals transcribed (solid arrows). Lipid disorder can also be indirectly related to patient RFEs (dotted arrow). In addition, other problems that were managed at a 'lipid disorder encounter' have been included to give an indication of co-morbidities managed with lipid disorder.

Age and sex distribution of patients

Patients managed for lipid disorder were more likely to be male (51.0%), higher than the proportion of males in the study overall (42.9%). Older patients were over-represented in lipid disorder encounters (88.5% were over 44) compared with the proportion of older patients (49.1% over 44) in the sample as a whole.

Reasons for encounter

At the 2,888 encounters where lipid disorder was managed, a total of 5,425 patient RFEs were described (188 per 100 lipid disorder encounters), somewhat more than in the total sample (151 per 100 total encounters). The RFEs at lipid disorder encounters were frequently for lipid disorder (22.3 per 100 lipid disorder encounters) and processes related to managing lipid disorder, such as prescription (26.9 per 100 lipid disorder encounters), test result (23.3 per 100 lipid disorder encounters), and test orders (14.0 per 100 lipid disorder encounters).

Other problems managed

At each encounter where lipid disorder was managed, a range of other problems was also reported. A total of 3,774 other problems were managed by the GP where lipid disorder occurred (131 per 100 encounters). The most common co-morbidities managed with lipid disorder were cardiovascular and endocrine problems associated with lipid disorders such as hypertension (31.6 per 100 lipid disorder encounters) and diabetes (8.2 per 100 lipid disorder encounters), which were reported at rates somewhat higher than for encounters overall. Hypertension was managed at over three times the rate at lipid disorder encounters than at encounters overall (8.6 per 100 encounters).

Prescriptions and other treatments

Medications were provided at a rate of 64.7 per 100 lipid disorder contacts. The top six medications for lipid disorder included five ‘statins’. Atorvastatin was the most common medication prescribed / advised / supplied at a rate of 24.5 per 100 lipid disorder problems. Simvastatin was prescribed at a rate of 23.3 per 100 lipid disorder contacts.

Clinical treatments were provided at a rate of 46.2 per 100 encounters, advice about diet, exercise or lifestyle making up the majority of these managements.

Referrals, tests and investigations

The patient was referred in only 26 cases, and 12 of these were referred to a dietitian. Rates for pathology orders were relatively higher, with a total of 1,800 pathology tests, mainly blood chemistry (57.6 per 100 problems).

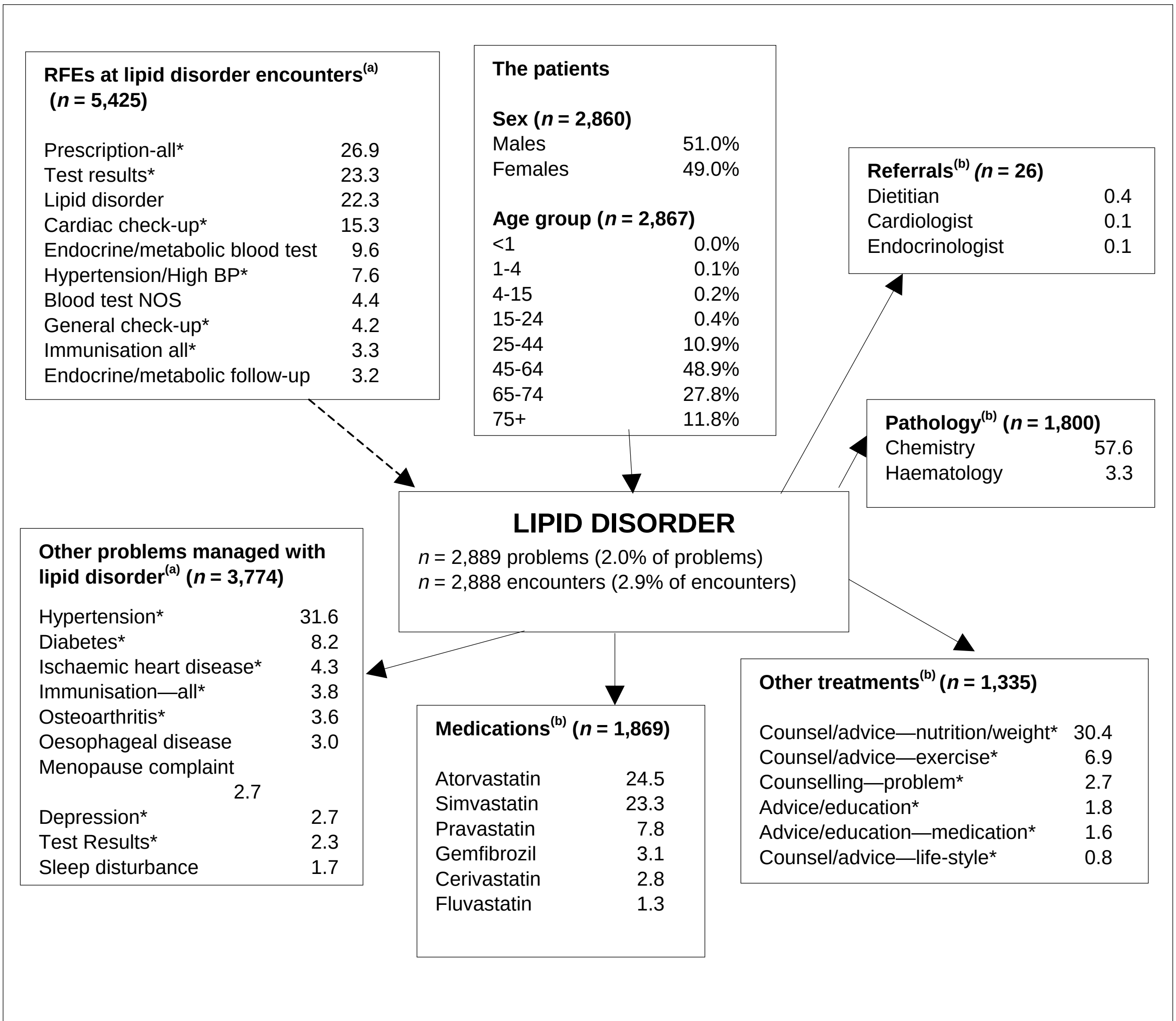


Figure 14.5: Management of lipid disorders in 2000–01

(a) Expressed as rates per 100 encounters at which lipid disorder was managed (*n* = 2,888).

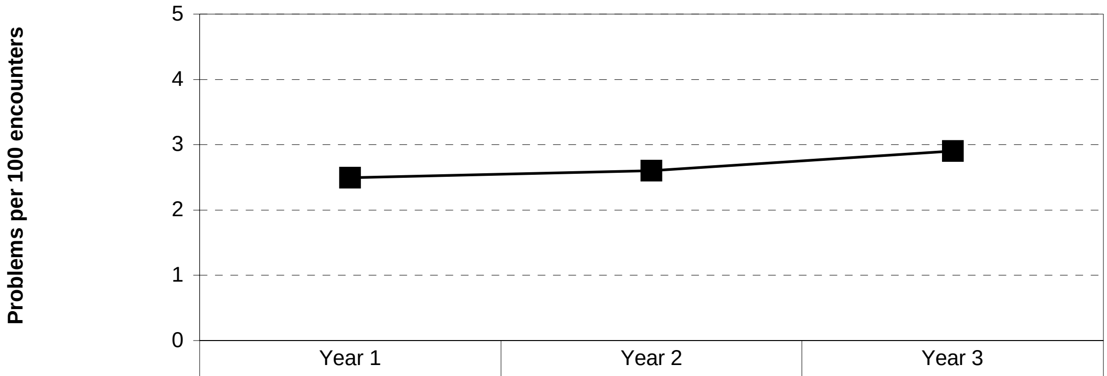
(b) Expressed as rates per 100 problems at which lipid disorder was managed (*n* = 2,889).

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendices 3–9).

Changes over time

Lipid-lowering agents were defined as the medications included in the ATC code C10A. For analysis, the lipid-lowering agents were further divided into the HMG CoA reductase inhibitors (statins, ATC subgroup C10AA) and all other lipid-lowering agents.

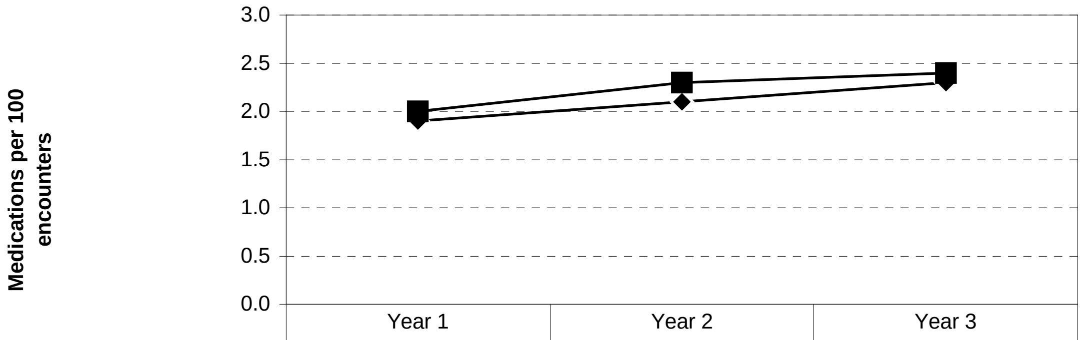
Multiple regression was used to examine trends in prescribing rates of lipid-lowering agents over time, after adjusting for the rate of management of lipid disorders. Figure 14.6 shows the rate of lipid disorders over time. As discussed in Chapter 7, Section 7.3, the management rate of lipid disorders increased significantly over the 3-year period.



	Year 1	Year 2	Year 3
Lipid disorders	2.5	2.6	2.9

BEACH data year

Figure 14.6: Management of lipid disorders over time



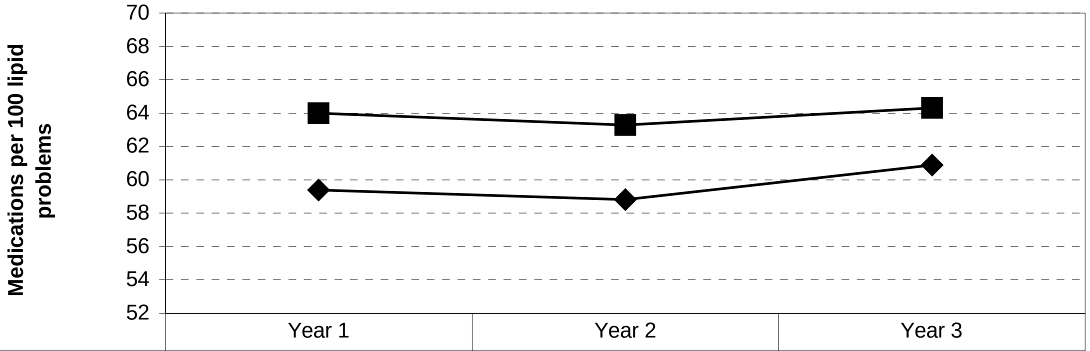
	Year 1	Year 2	Year 3
Statins	1.9	2.1	2.3
All lipid-lowering agents	2.0	2.3	2.4

BEACH data year

Figure 14.7: Prescribing rates of lipid-lowering agents over time

Figure 14.7 shows the rates of lipid-lowering medication per 100 encounters, unadjusted for morbidity. Statins represented the vast majority of lipid-lowering agents. As discussed in Chapter 9, Section 9.5, there was a significant increase from 1998–99 to 2000–01 in the rate of prescribing of lipid-lowering agents. In particular, there was an increase in the rate of prescribing of statins over the period.

The rate of prescribing of lipid-lowering agents specifically for lipid disorders appeared to remain steady for the period 1998–99 to 2000–01 at about 64 medications per 100 lipid disorder contacts (Figure 14.8).



	Year 1	Year 2	Year 3
Lipid drugs	64.0	63.3	64.3
Statins	59.4	58.8	60.9

BEACH data year

Figure 14.8: Prescribing rates of lipid-lowering agents for lipid disorders over time

Multiple linear regression

Total lipid-lowering agents

Multiple linear regression, with the rate of all lipid-lowering agents per 100 problems as the outcome revealed no significant change in the prescribing rate of lipid-lowering agents over time once changes in the management rate of lipid disorders were taken into account ($p = 0.09$).

Statins

Multiple regression with prescribing rate of statins per 100 problems as the outcome found a marginal increase over time in the prescribing rate of statins, once changes in the management rates of lipid disorders had been taken into account ($p = 0.02$).

Conclusion

Although the crude prescribing rates of lipid-lowering medications had increased in the 3-year period of the study, the observed increase in prescribing rates of lipid-lowering agents was largely explained by the accompanying increase in the management rates of lipid disorders. Within lipid disorders there was little evidence of any major change in medication management. It remains to be seen whether a slight rise in the statin prescribing rate heralds a future trend for greater use of statins in managing lipid disorders.

The importance of lipid disorders in the pathogenesis of vascular disease makes their detection and management an important part of primary and secondary prevention of vascular disease in general practice (National Preventive and Community Medicine Committee of the RACGP 2001).

There has been a significant increase in the rate of presentation of lipid problems per 100 encounters from 2.5 in year 1 to 2.9 in year 3. This extrapolates, on the basis of 103 million GP consultations per annum, to an additional 400,000 encounters per annum at which lipid disorders are managed. The increasing rate of lipid disorder encounters appears to be due to a constant annual addition of new cases (0.32 per 100 encounters) adding to a growing pool of patients on long-term therapy. It is notable that the detection rate of new cases does not appear to have risen in the 3 years in spite of an increasing emphasis on preventive care in general practice.

Management has not changed significantly during the 3-year period with statins constituting the large majority of medications prescribed at a constant total rate of 64 per 100 problem encounters. Counselling regarding nutrition, weight and / or exercise occurred at the rate of 37.3 per 100 problems seen in BEACH year 3. These data suggest that general practitioners are treating lipid disorders broadly within accepted guidelines (National Heart Foundation of Australia 1998).

14.4 Asthma inhalant medications and the management of asthma problems over time

Management of asthma in 2000–01

A problem was classified as 'asthma' if the GP recorded it in the diagnosis / problem section of the form as asthma; allergic, wheezy or asthmatic bronchitis; extrinsic allergic alveolitis; or status asthmaticus (ICPC–2 rubric R96). Asthma was the sixth most common problem managed in general practice. It was recorded on 2,821 occasions (at a rate of 2.8 per 100 encounters), accounting for 2.0% of all problems managed. A simple extrapolation based on approximately 103 million Medicare-claimed general practice consultations would then suggest there are approximately 2.9 million encounters per year in which GPs manage asthma. Figure 14.9 illustrates the relationship of asthma with other variables that are collected at the general practice encounter.

Age and sex distribution of patients

Patients managed for asthma were more likely to be female (55.0%). A large proportion of asthma patients (41.4%) were aged under 25 years. Comparison with the age distribution for total encounters (24.6% less than 25 years) indicates that young patients were over-represented at asthma encounters. Since 45.0% of asthma patients were male compared with 42.9% for the sample as a whole, males were slightly over-represented at asthma encounters.

Reasons for encounter

At the 2,818 encounters where asthma was managed, a total of 4,911 patient RFEs were described (174 per 100 asthma encounters), somewhat more than in the total data set (151 per 100 total encounters). For over a third of these encounters the patients described their reason for the encounter as asthma. Cough was another major reason for encounter (28.5 per 100 asthma encounters). Requests for medication (not necessarily for asthma) were also a frequent RFE, presenting at a rate of 16.0 per 100 asthma encounters. Other respiratory complaints such as shortness of breath (8.1 per 100), wheezing (7.1 per 100) and upper respiratory tract infection (3.9 per 100) were frequent RFEs. Other RFEs included respiratory follow-up (5.1 per 100) and throat symptom / complaint (2.9 per 100).

RFEs at Asthma encounters[(a)] (*n* = 4,911)	
Asthma	35.6
Cough	28.5
Prescription—all*	16.0
Shortness of breath, dyspnoea	8.1
Wheezing	7.1
Respiratory follow-up	5.1
Upper respiratory infection	3.9
Throat symptom/complaint	2.9
Cardiac check-up*	2.8
Immunisation all*	2.7

The patients

Sex (*n* = 2,782)	
Males	45.0%
Females	55.0%

Age group (n = 2,789)	
<1	1.0%
1–4	11.2%
4–15	17.1%
15–24	12.1%
25–44	21.3%
45–64	20.8%
65–74	10.2%
75+	6.3%

Referrals[(b)] (*n* = 78)	
Respiratory physician	0.7
Hospital	0.4
Paediatrician	0.4
Physiotherapy	0.2
Spirometry test	0.2

Pathology[(b)] (n = 44)	
Immunology	0.5
Chemistry	0.5

ASTHMA

n = 2,821 problems (2.0% of problems)

n = 2,818 encounters (2.8% of encounters)

Imaging[(b)] (n = 74)	
Plain	2.1

Other problems managed with Asthma[(a)] (*n* = 2,144)	
Upper respiratory tract infection	6.1
Hypertension*	5.3
Acute bronchitis/bronchiolitis	4.3
Allergic rhinitis	2.6
Immunisation—all*	2.5
Dermatitis	2.1
Depression*	1.9
Sinusitis acute/chronic	1.7
Respiratory infection, other	1.6
Oesophageal disease	1.4

Prescriptions[(b)] (*n* = 4,305)	
Salbutamol	52.1
Fluticasone propionate	14.5
Budesonide	13.5
Beclomethasone	11.4
Ipratropium inhaled	9.7
Terbutaline	8.8
Salmeterol	5.4
Fluticasone/Salmeterol	5.1
Prednisolone	4.5
Prednisone	3.6

Other treatments[(b)] (*n* = 768)	
Advice/education*	7.0
Advice/education—medication*	6.1
Physical function test*	4.2
Counselling—problem*	2.4
Advice/education—treatment*	2.3
Counsel/advice—smoking*	1.4

Figure 14.9: Management of asthma in 2000–01

(a) Expressed as rates per 100 encounters at which asthma was managed (*n* = 2,818).

(b) Expressed as rates per 100 asthma problems managed (*n* = 2,821).

* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendices 3–6).

At each encounter where asthma was managed a number of other problems may have been managed. Overall, a total of 2,144 other problems were managed by the GP where an asthma contact occurred. There were some differences in the most common co-morbidities managed with asthma compared with the total data set. Upper respiratory tract infection was the most common other problem at an asthma encounter (6.1 per 100 asthma encounters), managed at a similar rate as for the sample overall (6.9 per 100 encounters). Hypertension (5.3 per 100 asthma encounters), however, was managed less frequently than for the sample overall (8.3 per 100 encounters), perhaps reflecting the relatively young age of asthma patients. Acute bronchitis / bronchiolitis presented more frequently at asthma encounters (4.3 per 100) than for the sample overall (2.7 per 100 encounters).

Prescriptions and other treatments

Medication was by far the most common treatment for asthma; 4,305 medications were prescribed / advised or supplied at a rate of 153 medications per 100 asthma problems. Salbutamol was the most frequent medication (52.1 medications per 100 asthma problems). The other top medications included fluticasone propionate (14.5 per 100 asthma problems), budesonide (13.5 per 100) and beclomathasone (11.4 per 100).

Advice / education (7.0 per 100 asthma problems) and advice about medication (6.1 per 100 asthma problems) were the most common forms of management other than medication.

Referrals, tests and investigations

Referral rates for asthma were very low (2.7 per 100 asthma problems) compared with the total data set (7.2 per 100 problems). Referral to a respiratory physician (0.7 per 100 problems) was the most common. Less than one (0.4) in a hundred asthma problems were referred to hospital. There were few pathology (44) or imaging (74) tests ordered in the management of asthma.

Changes over time

As discussed in Chapter 7, Section 7.3, the management rate of asthma decreased significantly (p = 0.007) from 3.2 contacts per 100 encounters in 1999–00 to 2.8 per 100 encounters in 2000–01 (Figure 14.10). During this period, the prescribing rate of bronchodilators per 100 encounters decreased significantly, and the prescribing rate of preventive medications remained steady (Figure 14.11).

Figure 14.12 shows the prescribing rates of medications specifically for asthma problems over the 3-year period. There appears to be little change in prescribing rates of asthma medications for asthma over the period.

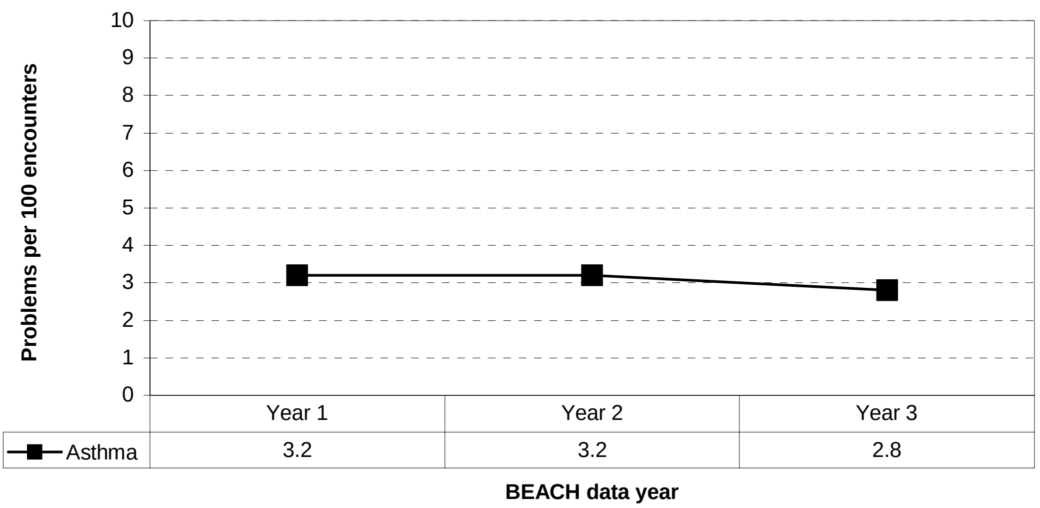
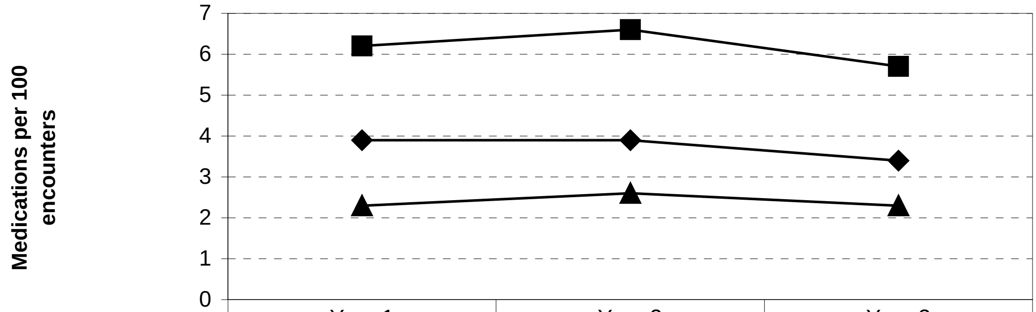


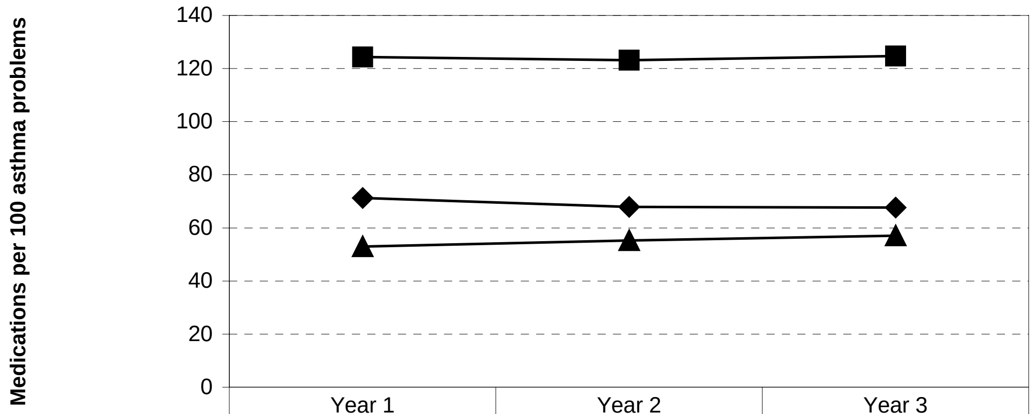
Figure 14.10: Management of asthma over time



	Year 1	Year 2	Year 3
Preventives	2.3	2.6	2.3
Bronchodilators	3.9	3.9	3.4
Total	6.2	6.6	5.7

BEACH data year

Figure 14.11: Prescribing rates of asthma medications over time



	Year 1	Year 2	Year 3
Preventives	53.0	55.3	57.0
Bronchodilators	71.3	67.9	67.7
Total asthma meds	124.4	123.2	124.7

BEACH data year

Figure 14.12: Prescribing rates of asthma medications over time for asthma problems

Multiple linear regression

Asthma preventives

Multiple linear regression with the rate of asthma preventives per 100 asthma problems as the outcome found no significant effect of time on the prescribing rate of preventive medications once the management rate of asthma was taken into account ($p = 0.17$).

Bronchodilators

Multiple regression with the rate of bronchodilators as the outcome found only a marginal effect of time on rate of bronchodilators, once the management rate asthma was taken into account (p = 0.053).

Conclusion

Although the decrease in asthma encounters in the 3-year period of 0.4 per 100 encounters may appear small, this represents a drop in annual asthma encounters of 400,000 per year when extrapolated to the 103 million per year general practitioner consultations. Whether this fall is due to a drop in prevalence of asthma or due to a drop in encounter rate resulting from better asthma control cannot be deduced from these data.

The rate of prescribing of bronchodilator medications also decreased during this period. The multiple regression analyses indicated that once changes over time in the management rate of asthma were taken into account there was little evidence of any real change in medication management for asthma over the 3-year period.

14.5 Non-steroidal anti-inflammatory drugs (NSAIDs) and the management of arthritis and other musculoskeletal problems

Use of NSAIDs in problem management in 2000–01

Figure 14.13 shows the relationship between the prescription or supply of NSAIDs, characteristics of the patients for whom they were prescribed, the problems for which they were prescribed, and other variables.

Rate of prescription, supply or recommendation

There were 6,706 occasions on which NSAIDs were recorded by GPs, accounting for 6.2% of all medications recorded. They were given at a rate of 6.7 per 100 total encounters and at a rate of 4.7 per 100 total problems. Celecoxib, despite being available for only 8 of the 12 months, was by far the most common individual NSAID.

Prescribed daily dose

Celecoxib had a median PDD of 200 mg, which falls at the midpoint of the recommended range. Ibuprofen had a median PDD of 1,200 mg, which is half the maximum dose suggested in MIMS (MIMS Australia 2001).

Age and sex distribution of patients

Patients under 25 years of age accounted for about 25.0% of all patients but only 9.7% of patients at NSAID encounters. On the other hand, those between 45 and 64 years of age were over-represented at NSAID encounters, accounting for 36.5% of all patients at these encounters. The sex distribution of the patients was similar to that of the GP patient population.

RFEs at NSAID encounters [(a)] (n = 11,071)

Back complaint*	20.6
Prescription-all*	12.3
Knee complaint	8.7
Neck complaint	6.6
Shoulder complaint	6.4
Foot/toe complaint	5.1
Cardiac check-up*	5.0
Leg/thigh complaint	3.8
Arthritis*	3.6
Osteoarthritis*	3.5

The patients

Sex (n = 6,578)	
Males	46.0%
Females	54.0%

Age group (n = 6,609)	
<1	0.1%
1-4	0.3%
4-15	1.8%
15-24	7.5%
25-44	26.0%
45-64	36.5%
65-74	16.0%
75+	11.8%

Referrals [(b)] (n = 659)

Physiotherapy	4.8
Orthopaedic surgeon	1.9
Rheumatologist	0.7

Co-medications[(b)] (n = 1,972)

Compound analgesic	7.5
Simple analgesic	7.0
Topical preparations	2.1
Anti-anxiety	1.6
Urosuric agents	1.2
Narcotic analgesic	1.1
Cortico steroids	1.1
Anti-ulcerants	0.7
Anti-depressant	0.5
Penicillin	0.5

Problems managed with NSAIDs[(b)] (n = 6,673)

Osteoarthritis*	20.6
Back complaint*	12.4
Sprain/strain*	9.7
Arthritis*	7.5
Bursitis/tendonitis/synovitis NOS	4.0
Gout	3.2
Musculoskeletal disease, other	2.6
Rheumatoid arthritis*	2.4
Other skin injury	2.2
Neck syndrome (incl osteoarthritis)	2.1

Pathology[(b)] (n = 765)

Chemistry	5.2
Haematology	3.5
Immunology	1.5
Microbiology	0.6

Imaging[(b)] (n = 998)

Plain	9.8
Other	5.0

Treatments[(b)] (n = 2,211)

Physical medicine/rehabilitation*	9.5
Advice/education—treatment*	5.5
Counsel/advice—exercise*	4.4
Advice/education*	3.1
Counsel/advice—nutrition/weight*	1.5
Counselling—problem*	1.5
Dressing/pressure/tamponade*	1.2
Other admin/document*	1.1
Sickness certificate	1.0
Advice/education—medication*	0.8

NSAIDs

n =6,706 (6.2% of total medications)

6.7 per 100 encounters (n = 6,659)
4.7 per 100 problems (n = 6,675)

Generic	% Group	Median PDD
Celecoxib **	36.7	200 mg
Diclofenac	18.0	100 mg
Ibuprofen	14.6	1200 mg

Figure 14.13: Inter-relationship of NSAIDs with other variables 2000–01

(a) Expressed as rates per 100 encounters at which a benzodiazepine was prescribed or supplied (n = 4,019)

(b) Expressed as rates per 100 problems for which a benzodiazepine was prescribed or supplied (n = 4,053).

* Indicates multiple ICPC–2 and ICPC–2 PLUS codes (see Appendices 3–9).

** Celecoxib was only available on the PBS from August 2000 i.e. 8 months of this 12-month period.

Reasons for encounter

The most commonly described patient reason for encounter was back complaint, described at a rate of 20.6 per 100 encounters at which NSAIDs were prescribed, given or recommended. A request for prescription was also a commonly cited reason, at 12.3 per 100 of these encounters.

Problems managed

Osteoarthritis was the most common problem managed with NSAIDs, accounting 20.6% of such problems. Back complaint was the second most common at 12.4% of problems.

Other medications prescribed or supplied

A total of 1,972 medications were prescribed or supplied at the same encounter and for the same problem for which NSAIDs were given. Compound analgesics were the most common co-medications, prescribed, supplied or advised at a rate of 7.5 per 100 of these problems.

Other treatments

Other treatments were provided at a rate of 33.1 per 100 problems managed with NSAIDs, similar to the total data set (34.2 per 100 problems). Physical medicine / rehabilitation was the most frequent non-pharmacological treatment, given at a rate of 9.5 per 100 of these problems.

Referrals, tests and investigation

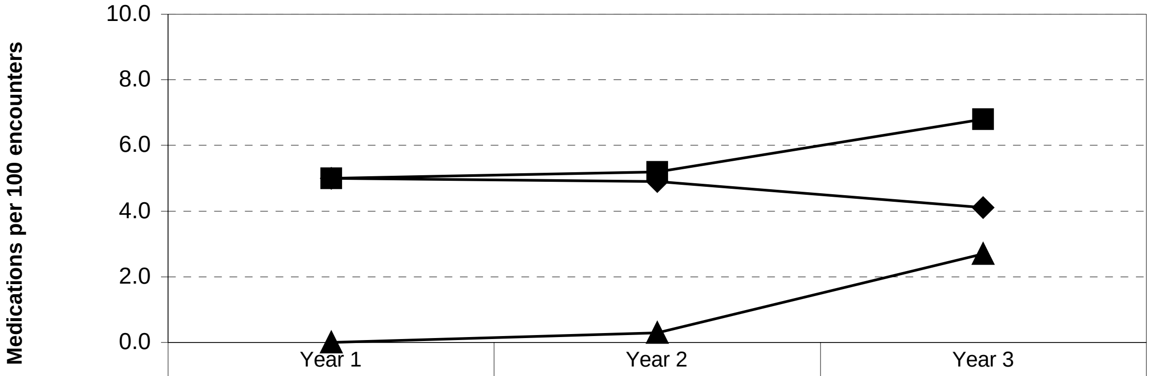
Patients were referred to other health professionals for these problems at a rate of 9.9 per 100 problems managed, most commonly for physiotherapy. Pathology was ordered at a rate of 11.5 per 100 problems managed with NSAIDs, and imaging was ordered at almost double the rate in the total data set, at a rate of 15.0 per 100 encounters.

Changes over time

NSAIDs were defined as the medications grouped in the ATC code M01A. For analysis the NSAIDs were further subdivided into coxibs (ATC subgroup M01AH) and all other NSAIDs.

Musculoskeletal problems (ICPC chapter ‘L’) were divided into all arthritic problems (rheumatoid arthritis, osteoarthritis, and unspecified arthritis) versus all other musculoskeletal problems. These broad categories of problems of interest were derived from the recommended indications for the use of coxibs (MIMS Australia 2001) and the problems for which NSAIDs were most frequently prescribed (Figure 14.13). The prescribing rate of NSAIDs for arthritic problems was compared with the prescribing rate for other musculoskeletal problems. Multiple linear regression was used to examine trends over time in the prescribing rate of NSAIDs for arthritis, other musculoskeletal problems and all other problems.

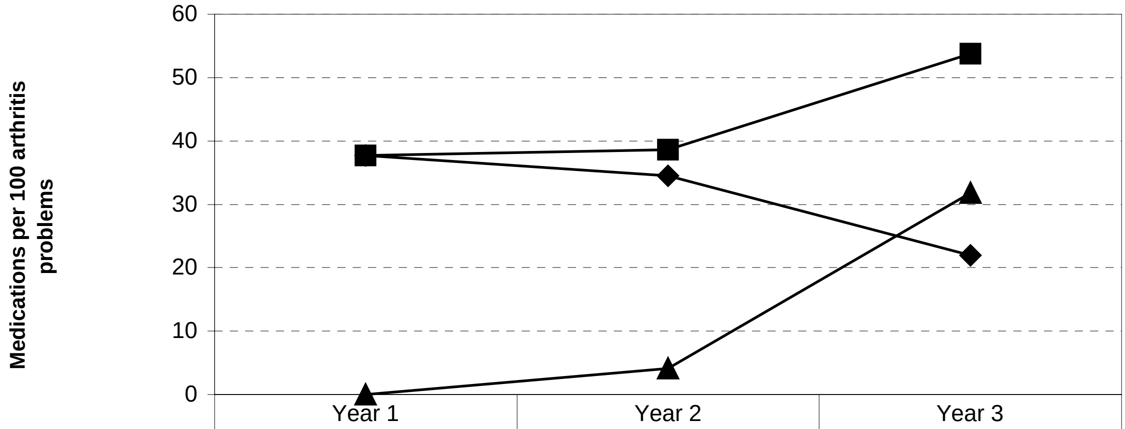
Figure 14.14 shows the prescribing rate of NSAIDs per 100 encounters unadjusted for morbidity. As discussed in Chapter 9, Section 9.5, the univariate analysis indicated that the overall prescribing rate of NSAIDs had increased over the 3-year period. Specifically, the prescribing rate of coxibs had increased significantly from 1999–00 to 2000–01, and the prescribing rate of the other NSAIDs had remained steady.



	Year 1	Year 2	Year 3
Coxibs	0.0	0.3	2.7
Non-coxibs	5.0	4.9	4.1
Total	5.0	5.2	6.8

BEACH data year

Figure 14.14: Prescribing rates of NSAIDs over time



	Year 1	Year 2	Year 3
Total NSAIDs	37.7	38.6	53.8
Coxibs	0.0	4.1	31.8
Other NSAIDS	37.7	34.5	22.0

BEACH data year

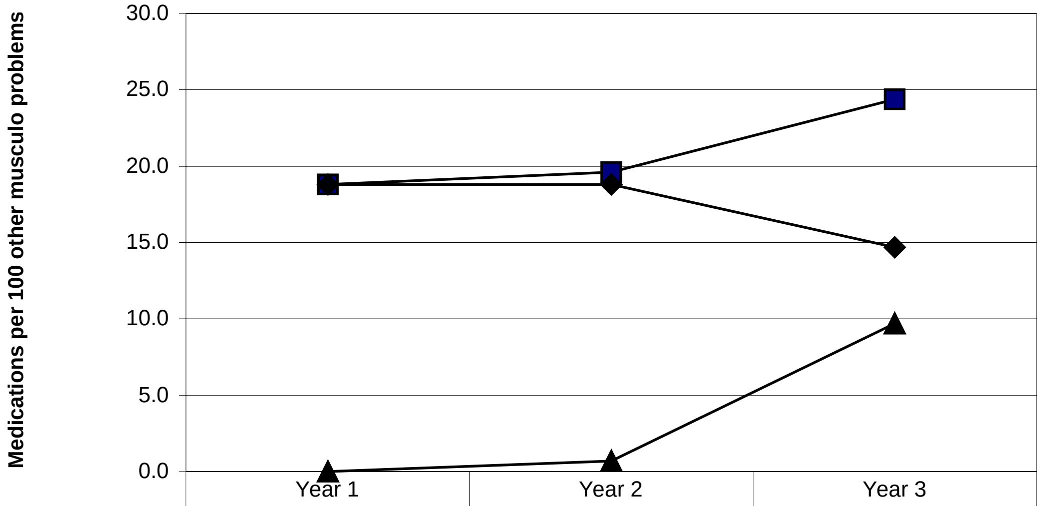
Figure 14.15: Prescribing rates of NSAIDs over time for all arthritis

Note: Includes multiple ICPC–2 codes for osteoarthritis and arthritis (see Appendix 3) and rheumatoid arthritis (ICPC rubric L88).

The rate of total NSAID prescribing specifically for arthritic problems increased from around 38 medications per 100 arthritic problems in 1999–00 to 54 per 100 arthritic problems in 2000–01 (Figure 14.15). This increase was due entirely to an increase in the prescribing rate of coxibs from 4 per 100 arthritic problems in 1999–00 to 32 per 100 arthritic problems in 2000–01. At the same time the prescribing rate of other NSAIDs decreased somewhat from 35 per 100 arthritic problems in 1999–00 to 22 per 100 in 2000–01. This changing pattern of medication management (illustrated in Figure 14.15) indicates that the increase in coxibs was largely responsible for an overall increase in the total NSAID medication rate for arthritic problems.

There was also substantial substitution of other NSAIDs by coxibs. By 2000–01 in the management of arthritic problems, coxibs had become more frequently prescribed than all other NSAIDs combined.

The prescribing rate of NSAIDs for musculoskeletal problems other than arthritis also rose over the period 1999–00 to 2000–01 (Figure 14.16). The prescribing rate of coxibs for other musculoskeletal problems increased, and the rate of all other NSAIDs decreased. However in 2000–01 coxibs still represented less than half of all NSAIDs prescribed for other musculoskeletal problems.



	Year 1	Year 2	Year 3
Total NSAIDS	18.8	19.6	24.4
Coxibs	0.0	0.7	9.7
Other NSAIDS	18.8	18.8	14.7

BEACH data year

Figure 14.16: Prescribing rates of NSAIDs over time for other musculoskeletal problems

Multiple linear regression

All NSAIDs

Multiple linear regression, with the prescribing rate of total NSAIDs as the outcome found a significant time x problem interaction for the prescribing rate of total NSAIDs ($p < 0.001$).

This interaction indicates that the increase over time in the prescribing rate of total NSAIDs for arthritic problems was more pronounced than the increase in the prescribing rate of total NSAIDs for other musculoskeletal problems.

Coxibs

Multiple regression with the prescribing rate of coxibs as the outcome found a significant time×problem interaction for the prescribing rate of coxibs ($p < 0.001$). This interaction indicates that the rate of uptake of coxibs from 1999–00 to 2000–01 was more pronounced for arthritic problems than for other musculoskeletal problems.

Other NSAIDs (not coxibs)

Multiple regression, with the rate of NSAIDs other than coxibs as the outcome, found a significant time × problem interaction ($p < 0.001$). This interaction indicates that, from 1999–00 to 2000–01 the decrease in the prescribing rate of other NSAIDs was more pronounced for arthritic problems relative to other musculoskeletal problems.

Conclusion

From 1999–00 to 2000–00, there was a marked increase in the prescribing rate for total NSAIDs for both arthritic problems and other musculoskeletal problems, an increase which was entirely explained by an increase in the rate of coxibs. There was evidence that coxibs were also substituted for other NSAIDs for both arthritic problems and other musculoskeletal problems, as there was a decrease in medication rates of other NSAIDs. Significant time × problem interactions indicated that the increase in the prescribing rate of total NSAIDs, the uptake of coxibs and the discarding of other NSAIDs were significantly more pronounced for arthritic problems relative to other musculoskeletal problems.

The introduction of coxibs was accompanied by a wave of promotion emphasising the increased safety of this group of NSAIDs over older forms. These data indicate considerable prescribing of these drugs. Although the merits of substituting coxibs for older NSAIDs has been questioned by some authorities (National Prescribing Service 2001) the coxibs have clearly found some favour with GPs.

15 Discussion

15.1 Overview of results

This report has presented summaries of the most frequent events that occurred in general practice in Australia in 2000–01. Due to their high relative frequency these events form a large part of a GP's workload. They also demonstrate the breadth of general practice, the many reasons people have for attending a GP, and the wide range of problems managed, ranging from acute to chronic disease and from physical illness to psychosocial issues. This report has shown that prescribed medication is the most common form of problem management, but is used alone in the management of only 40% of problems. It has demonstrated the importance of counselling, advice and procedural work in a GP's working day. The small number of patients admitted to hospital or referred to the emergency department or to specialists indicates the extent to which patients are cared for by GPs in the community.

These data provide other researchers with a national average against which they can compare smaller study samples. The relatively large sample size underlying these national data, and the consequent relatively accurate estimates of the frequency of more common events also allow researchers to plan studies of specific morbidity and its management by providing better estimates of required GP sample size through a knowledge of the likely occurrence of the event of interest. They provide health care planners with an up-to-date view of the common issues taken to and managed by GPs, and an opportunity to relate prescribing patterns and costs to the management of specific types of morbidity.

Changes over time

For the first time, this report of the BEACH program has demonstrated the usefulness of ongoing data collection in the measurement of changes in general practice over a 3-year period. The third year of the program provided the third measurement point required for time series analysis.

Changes in rates of management of specific types of morbidity were described in Chapter 7 and changes in prescribing rates of some medications were demonstrated in Chapter 9. On the basis of these findings, four topics were selected for further investigation into the relationship between changes in pharmacological management and changes in morbidity rates (Chapter 14). The implications of these changes need to be considered in light of recent events.

For example, recently there has been considerable publicity given to a hypothesised increase in the prevalence of depression in the community. Certainly this hypothesised increase is supported by results of BEACH and its predecessor, when change is considered over the last decade. In 1990–91 depression was only the tenth most common problem managed in general practice, at a rate of 2.1 per 100 encounters (Bridges-Webb et al. 1992). In the 3 years from 1999 to 2001, depression has remained in fourth position of relative problem frequency, being managed at a rate of around 3.5 contacts per 100 encounters (a 70% increase since 1990–91).

Based on recent attendance data from the HIC (DHAC 2000), this would represent an increase in the total annual encounter rate for depression in general practice from an estimated 2.16 million encounters to 3.61 million encounters. However, annual general practice Medicare items of service have risen over the decade, from about 83 million in 1990–91 (Bridges-Webb et al. 1992) to around 100 million in 1998 (DHAC 2000). Therefore, in real terms the increase in GP–patient encounters involving the management of depression is more likely have been more than twofold, from 1.74 million in 1990–91 to 3.61 million encounters in 1998–99. Whether this represents an increase in population prevalence over the decade, or is the result of a greater acceptance by society of depression as being an acceptable and treatable problem, cannot be measured from these data. However the BEACH data demonstrate that since 1998–99 the management rate of depression in general practice has remained steady.

New MBS items for the management of psychological problems are proposed for introduction during 2002. These could act as an incentive to GPs to conduct more psychological counselling. However, this report has demonstrated that even without such incentives, there has been a significant increase in the use of psychological counselling in the management of depression over the 3 years accompanied by no change in the overall medication rate. The overall increase in GP use of non-pharmacological clinical management techniques for a range of problems (demonstrated in Chapter 10) is also worthy of note. It will therefore be interesting to measure the effect of the introduction of the new item numbers on the relative frequency of provision of counselling, particularly if, as suggested by Hickie and Marks (2001), GPs will be required to complete a training course prior to using these items. As BEACH continues, it has the potential to measure the effect of the introduction of these and other new MBS item numbers on GP practice.

The evaluation of changes in practice over time also provides an opportunity to assess some aspects of quality of care. Changes in the pharmacological management of depression over the 3-year period demonstrated a significant substitution of the older anti-depressants with SSRIs (Chapter 14). As SSRIs are the pharmacological treatment of first choice by Australian psychiatrists for all forms of depression (Hickie et al. 1999), this change can be seen as an improvement in quality of care. Again, future trends in this practice will be measurable over time.

The use of BEACH data to measure the effect of listing a new pharmacological preparation on the PBS is clearly demonstrated in the investigation of the changes in the pattern of GP prescription or provision of NSAIDs. The coxibs were put on the PBS only during this third year of the BEACH program and its effect on GP prescribing patterns was considerable (Chapter 14). The pattern of NSAID prescribing in general practice over the past decade is worth noting. In 1990–91 GPs prescribed NSAIDs at a relative rate of 5.9 per 100 encounters (Bridges-Webb et al. 1992). In 1998–99 this rate had dropped to 5.0 per 100 encounters, increased to 5.7 per 100 in the second year of BEACH and then to 6.8 per 100 encounters in 2000–01. One possible hypothesis for this pattern of change is that during the 1990s some people did not go onto NSAID medication because of the increased knowledge of past or possible side effects. When the cox-2s became available, many of these people may have chosen to use this new type of NSAID with less fear of side effects. This would explain the fact that only a partial substitution of coxibs for other NSAIDs was demonstrated in Chapter 14 in parallel with the significant jump in the number of occasions NSAIDs were supplied or prescribed. It is worthy of note that celecoxib was the medication in second place in those most frequently supplied directly to the patient by the GP. This occurred at a rate of only 0.3 per 100 encounters, and so these supplied medications accounted for about 11% of the total celecoxib prescribed or supplied.

The current BEACH year will provide a clearer indication of the extent to which these medications are being used to replace other NSAIDs and the extent to which they are being prescribed to a new group of patients.

BEACH is the only data source that provides an indication of GP use of non-pharmacological management. Recently some media reports have raised doubt about the extent to which GPs are attempting to effect a change in patient lifestyle prior to prescribing lipid-lowering agents.

This report has demonstrated that GPs are providing advice and counselling, with particular attention to nutrition, at a rate of 46 per 100 contacts with lipid problems. Medications were prescribed at a rate of 64 per 100 contacts. This suggests that GPs are considering patient lifestyle issues in the management of lipid disorders.

The effect of GP and patient educational interventions on practice patterns can less easily be measured. Often, multiple interventions occur in parallel to system changes. For example, Chapter 14 showed a measured decrease in the relative rate of GP management of asthma over the 3-year period. Many divisions of general practice have introduced a range of programs to effect improvement in the care of people with asthma in an effort to decrease the number of hospitalisations for these patients. Increased patient education in self-management of this problem has been encouraged, as has the use of a structured management plan by all patients with diagnosed asthma. At the same time there have been a number of changes in the availability of some asthma medications for over-the-counter purchase. The extent to which each of these has affected the measured decrease in the number of attendances for asthma in general practice cannot be assessed from the BEACH data. However, this trend will be worthy of further investigation in the coming years, particularly after the introduction of new MBS item numbers related to the completion of an Asthma 3+ Visit Plan (DHAC 2001a).

Unfortunately it was not possible to investigate changes in pathology and imaging order patterns in this report. When BEACH began, the codes introduced for these orders were relatively broad. During the second year of the program the pathology test orders recorded by the GPs were investigated in detail, and under a grant from the DHAC (Diagnostics and Technology Branch) a more specific coding system was developed to reflect the terminology used by GPs in these orders. In the third year of the program, the same approach was applied to the orders for imaging recorded by GPs in Year 2. This means that the data recorded in the first year of BEACH were not coded in a manner that can be compared with that recorded in Years 2 and 3. Quality use of pathology is receiving increased attention from the DHAC (DHAC 2001b). The assessment of changes in ordering patterns for pathology and imaging for years 2–4 will be possible in the next annual report.

Patient health risk factors

The third year of results describing the risk behaviours of adults attending general practice demonstrated remarkable consistency with those of earlier years. About 19% of these adults reported they were daily smokers and about 24% reported at-risk levels of alcohol consumption (from 32.8% in 1998–99 to 34.1% in 2000–01). However there was significant increase in the proportion of patients who were classed as obese (from 18.4% to 20.2%) and in the proportion classed as overweight (from 32.8 to 34.1%)—each of these two categories rising by about 1% per year. These results suggest that GPs are provided with ample opportunity to provide their patients educational interventions regarding alcohol intake.

The extent to which they are providing advice and counselling on lifestyle and diet to patients with lipid disorders (noted above) indicates their awareness of the need for many of their patients to decrease their health risk behaviours.

15.2 Methodological issues

Cluster sampling

The statistical techniques applied in BEACH recognise that the sampling is based on GPs and that for each GP there is a cluster of encounters. It also suggests that each cluster may have its own characteristics, being influenced by the characteristics of the GP. While ideally the sample should be a random sample of GP–patient encounters, such a sampling method is impractical in the Australian healthcare system. The reader should, however, be aware that the larger the GP sample and the smaller the cluster the better. The sample size of 100,000 encounters from a random sample of 1,000 GPs has been demonstrated to be the most suitable balance between cost and statistical power and validity (Meza et al. 1995).

GP participation rates

The participation rate of GPs in BEACH was 29.8% of those with whom contact was established. This was considerably lower than the response rate for the first (38.4%) (Britt et al. 1999c) and second (39.1%) (Britt et al. 2000) BEACH years. The participating GPs were found to be older and less busy than those who declined to participate, and post-stratification weighting was applied to the encounter data to deal with these differences.

Nevertheless, the drop in participation in this third year of the program is notable and the research team believes that a number of system factors influenced this result.

- The quality assurance cycle: One of the main reasons many GPs agree to participate in BEACH is because they receive 25 audit points towards their quality assurance requirements. The 3-year QA cycle therefore influences response rates.
  - BEACH 1998–99 started in April of the last year of the QA triennium. Those GPs who had not yet gained their QA points may have been keen to participate. It also included the first 3 months of the new QA cycle, when those keen to complete the audit requirements early in the triennium may have been attracted to the BEACH program when approached.
  - BEACH 1999–00 started in April in the first year of the new QA triennium and therefore included 9 months of the first year and 3 months of the second. Many GPs may have been keen to complete their requirements at this early to middle stage of the triennium.
  - BEACH 2000–01 started in April 2000 and included 9 months of year 2 of the triennium and the first 3 months of the last year of the triennium. Most GPs said they had completed their audit requirements when randomly approached in the BEACH sample. Many of those who still needed their audit points for the current triennium appeared to feel no urgency about the matter, as they still had until the end of 2001 to do so.

  If these assumptions are correct, we can anticipate an upsurge in response rates in the current beach year (Year 4).

- In the year 2000 the RACGP distributed a new document outlining many new and varied options available to GPs for their audit requirements. Sudden availability of a wide range of new options may well have influenced GPs to complete an alternative option prior to being approached through random sampling for the BEACH program.
- There are increasing demands being made on GPs to participate in a wide range of non-clinical activities such as divisional projects and programs and other audits (such as those offered by the National Prescribing Service), and this may influence the extent to which they are willing to participate in BEACH.
- GPs aged less than 35 years were underrepresented in the final GP sample and this could be due to the fact that general practice registrars are not required to undertake QA activities during training and during the QA triennium of completion of training. Some incentives may need to be introduced to encourage participation of these younger GPs in BEACH. A similar issue is arising with recruitment of the increasing number of unrecognised GPs now allowed to practice in needy rural areas, who by special arrangement can claim A1 Medicare items of service but who are not required to undertake QA activities. Incentives may also be required to encourage the participation of these GPs to ensure sufficient representation of general practice in these areas.
- Sampling issues also affect recruitment levels but these have been reasonably constant influences over the period of the BEACH program.

  Eight per cent of the GPs in the sample provided by the DHAC from the HIC records could not be contacted. A large proportion of these were not practising at the time of recruitment, having retired, died, gone overseas or taken maternity leave since their selection from the HIC records. As the aim is to represent active, practising GPs the exclusion of these GPs from the sample is a valid and necessary action. However, there were also some GPs who had left the practice to which the BEACH approach letter was sent, and could not be traced. In many of these cases the practice informed recruiting staff that the GP selected had not been at the practice for some years. This suggests that the HIC system of practice address registration is not error-free.

Response rates to specific variables

In the second year of the BEACH study some changes were made to the layout of the forms based on the experience gained in the first year of the program. The second annual report raised some methodological issues regarding the effect of these changes on GP completion rates for some variables, including some patient characteristics and the number of repeat prescriptions (Britt et al. 2000). These effects were noted only during analysis of the Year 2 data which was conducted in parallel with the Year 3 data collection. Therefore changes could not be made for the third year.

Changes in layout were made at the end of the third year in an effort to improve completion rates for some variables. These included changes to the layout of the patient characteristic questions and more-specific instructions regarding number of repeats. The next annual report may well provide greater insight into the effects of these changes on completion rates, and therefore on reliability of these results.

Electronic BEACH data collection: a controlled trial

The BEACH program is currently a paper-based data collection program. Many people have recently suggested that with the increased GP uptake of electronic prescribing systems or full clinical systems (electronic health records, EHRs), national data could soon be drawn passively directly from the GPs' computers. Although an attractive proposition, there are many barriers to its implementation:

- To obtain a national random sample of practising GPs each GP must have an equal chance of selection. Until all GPs are using EHRs this would not be the case. Further, with the recognised variance between GPs (Crombie 1990) it is likely that those who do not have EHRs differ from those who do. Sampling of only GPs with EHRs would therefore give a biased national result.
- Many GPs currently use electronic prescribing systems rather than full EHRs. The extent to which data are entered at encounters that do not involve a prescription is not known. Further, this report has demonstrated that drug prescription is only one of many management techniques used by GPs. The measurement of GP clinical activity should not be confined to the measurement of prescribing behaviour any more than it should be limited to activities claimed only through the MBS.
- The structure of electronic clinical systems varies, as do the coding and classification systems used. Drawing reliable and representative data from electronic clinical systems is likely to require the introduction of a standardised minimum data set and use of standard coding and classification systems in all electronic clinical systems. Such coding systems will be required for each of the data elements within the minimum data set (i.e. such variables as patient cultural background, pathology orders, clinical services, procedures etc.) as well as the problems under management).
- Issues of privacy and confidentiality also need to be resolved.

It may therefore be many years before data collection programs aiming to describe national general practice activity will be able to rely on passive data collection directly from EHRs.

Another possibility is for data to be actively collected on computer, either as the sole method of data collection (when all GPs have EHRs), or in parallel with paper-base data collection. The GPSCU has recently received funding to conduct a longitudinal matched controlled trail of active computerised data collection compared with paper-based data collection, in the Western Sydney area. Interactive software is currently being developed that reflects the data elements collected in BEACH. This initial trial software will not interact with any clinical system being used by the GP so that s/he will be required to actively complete each field covered by the recording form. However, the system will include the ICPC–2 PLUS coding system and the CAPS pharmaceutical coding system with their search engines. This will ensure that on term selection or entry, the data will be coded and classified automatically in the background.

The trial will be conducted with a sample of 40 GPs who participated in BEACH during 2000–01 and, apart from the method of data collection, the process will remain the same as that normally used in the BEACH program. The results of the two data sets will be compared after statistical adjustment for differences in the age–sex distribution of the patients seen. Management patterns will be compared after adjustment for the morbidity managed in the two time frames. If this trial demonstrates that the data collected by active computerised methods is not significantly different from that collected on paper and the method is found to be acceptable to the participating GPs, future participants in BEACH could be offered the option of paper- or computer-based methods.

Other BEACH applications

Under DHAC funding, the National Consortium for Education in Primary Medical Care (NCEPMC) has recently established an alternative pathway to general practice recognition. Practitioners who wish to take this pathway to the FRACGP examination must complete 400 hours of education prior to sitting the examination. They first must assess their educational needs so that the educational program can be planned around the individual practitioner. The general practitioners complete the BEACH process as a tool to assist in the identification of specific educational needs. Currently these practitioners complete BEACH on paper. However, if the trial of active computerised collection described above proves valid and acceptable to the GPs, participants in the Alternative Pathway program will be offered this method.

15.2 Comparing BEACH data with those from other sources

Users of the data reported in this publication might wish to compare the results with those from other sources, such as that from the HIC (HIC 2000). Although integration of data from multiple sources can provide a more comprehensive picture of the health of the Australian community, the user must keep in mind the limitations of each data set and the differences between them. Some examples are presented below.

The Pharmaceutical Benefits Scheme (PBS)

If comparing BEACH prescribing data with data from the PBS, the reader should be conscious of the following:

- Total medications in BEACH include those prescribed, supplied to the patient directly by the GP, and those advised for over-the-counter purchase.
- Each prescription recorded in the BEACH program reflects the GP's intent that the patient receives the prescribed medication and the specified number of repeats. The prescription, irrespective of the number of repeats ordered, is counted only once.
- Prescriptions are counted in BEACH irrespective of whether or not the medication is covered by the PBS for all patients, for those holding a health care card or for those who have reached the safety net threshold.
- The BEACH data does not provide information on the number of prescriptions not filled by the patient (and neither does the PBS).

In contrast, the PBS data:

- count the prescription each time it crosses the pharmacist's counter;
- count only prescribed medications subsidised by the PBS and costing more than the minimum subsidy and which are therefore covered by the PBS for all patients, or are prescribed for those holding a health care card or for those who have reached the safety net threshold.

These differences will influence not only the numbers of prescriptions counted but also their distribution. For example, the majority of hormone replacement therapies (HRTs) fall under the PBS minimum subsidy level and would not be counted in the PBS data unless patients receive the medication under the PBS scheme because they are a health care card holder or have reached the annual safety net threshold. The PBS would therefore underestimate the number of HRT prescriptions filled and the proportion of total medications accounted for by HRTs.

The Medicare Benefits Schedule (MBS) items

If comparing the BEACH data with Medicare data, remember:

- The MBS data provided by the DHAC does not usually include data about patients and encounters funded through the Department of Veterans' Affairs. The effect of this on comparisons between data sets was demonstrated in Chapter 4 (Section 4.3) in the comparison of the age–sex distribution of patients at A1 encounters in BEACH with those of the MBS A1 items of service. In previous BEACH years it was thought the BEACH data over-represented encounters with elderly male patients, even after post-stratification weighting. In this BEACH year, the reason for this apparent over-representation became clear. The BEACH A1 items of service included encounters claimable through the Department of Veterans' Affairs and the MBS data did not. Further comparisons of the age–sex distribution of the encounters from the two data sources, excluding those in the BEACH data set that were recorded as claimable through the Department of Veterans' Affairs, discounted this apparent difference.
- The BEACH participants have the opportunity to record only one Medicare item number on each encounter form. They are instructed to select the more general item number where two item numbers apply to the consultation because additional services attracting their own item number (e.g. 30026–repair of wound) are counted as actions in other parts of the form. This results in a lesser number of 'other' Medicare items than would be counted in the Medicare data.
- The BEACH database includes data about all clinical activities, not only those billed to the MBS. Both direct (patient seen) and indirect (patient not seen but a clinical activity undertaken) consultations are recorded. Some of these are paid by other funding sources (such as State health departments, private insurance companies, workers compensation etc.) and some are provided free of charge by the GP (see Chapter 5). In contrast, the MBS data include only those GP services that have been billed to Medicare.

Pathology data from the MBS

The BEACH database includes details of pathology tests ordered by the participating GPs. When comparing these data with those in the MBS, remember:

- BEACH reflects the GP's intent that the patient have the pathology test(s) done and information as to the extent to which patients do not have the test done is not available.
- Each pathology company can respond differently to a specific test order label recorded by the GP. Further, the pathology companies can charge through the MBS only for the three most expensive tests undertaken even where more were actually undertaken. This is called 'coning' and is part of the DHAC pathology payment system.
- Pathology MBS items contain pathology tests grouped on the basis of cost. An item may therefore not give a clear picture of the precise tests performed.

The effect of these factors is that the MBS pathology data includes only those tests billed to the MBS after interpretation of the order by the pathologist and after selection of the three most expensive tests. This effect will not be random. For example, in an order for four tests to review the status of a patient with diabetes it is likely that the HbA1C will be the least expensive and will 'drop' off the billing process due to coning. This would result in an underestimate of the number of HbA1Cs being ordered by GPs.

The distributions of the two data sets will differ, reflecting on the one hand the GP order and on the other the MBS-billed services after coning and assignment of MBS item number.

Those interested in GP pathology ordering will find more detailed information from the BEACH program in *Pathology Ordering by General Practitioners in Australia 1998* (Britt et al. 1999a).

Imaging data from the MBS

Some of the issues discussed regarding pathology data also apply to imaging data. Although coning is not an issue for imaging, radiologists are free to decide whether or not the test ordered by the GP is the most suitable and whether to undertake other tests of their choosing. The MBS data therefore reflect the tests that are actually undertaken by the radiologist whereas the BEACH data reflect those ordered by the GP. Those interested in GP imaging ordering will find more detailed information from the BEACH program in *Imaging Orders by General Practitioners in Australia 1999–00* (Britt et al. 2001).

16 Conclusion

We believe that it would be useful for researchers to keep up databases…over several years so that changes over time and their consequences on quality of care and practice patterns can be quantified and a predictive model developed. Such a model could be used for projecting changes to the system and for planning in the future. (Norton et al. 1994)

This report has summarised general practice activity in Australia in 2000–01 and described the normative behaviour of almost 1,000 general practitioners who together have more than 10,000 years of clinical experience in this role. Further, it has demonstrated the usefulness of continuous data collection, as opposed to one-off studies, in the measurement of changes in practice over time.

No single report can investigate all the topics of possible interest to the community, the government and industry. The examples of analyses provided in this report may help the reader understand the many ways in which this relational database can be analysed. Many other questions may arise in the reader's mind as to how a particular morbidity is managed in general practice, for whom a particular medication is prescribed, or the extent to which a specific clinical activity has changed since the BEACH program began. Others who are interested in the health of the population at a State or Territory level will find sufficient sample size already available for the more populated States to allow State based reporting. The BEACH database now contains records of about 350,000 GP–patient encounters, providing a rich data source for studies of such specific topics. Access to the data is described below.

Norton et al. (1994) suggested that an ongoing database could be useful in measuring changes over time. Australia now has such a database of general practice activity. A wide range of people from government, industry and research organisations are currently using BEACH data. The uses to which they have already been put in the area of policy development have been summarised elsewhere (Britt & Miller 2000). The potential of this rich database is immense for those interested in health services research, population health, health economics or quality of health care.

16.1 Current status of BEACH

The BEACH program is now in its fourth year. The database for the first 3-years includes data pertaining to approximately 300,000 GP–patient encounters from more than 3,000 GPs. Each year the GPSCU publishes an annual report of BEACH results through the Australian Institute of Health and Welfare in which the results from the previous BEACH data year are reported on a national basis for the more common events. Other reports use the database for secondary analyses of a selected topic or for a specific research question. A recent example is a study of imaging ordering by GPs (Britt et al. 2001).

16.2 Access to BEACH data

Public domain

In line with standard Australian Institute of Health and Welfare practice, this annual publication provides a comprehensive view of general practice activity in Australia.

Abstracts of results for the substudies conducted in the third year of the program and not reported in this document are available through the web site of the Family Medicine Research Centre (of which the GPSCU is a part) at http://www.fmrc.org.au. The subjects covered in the abstracts are listed below, together with an indication of the number of GPs and the number of encounters in each subsample.

Abstract Number	Subject	Number of encounters	Number of GPs
13	Perceived stress in general practice patients	2,891	90
14	Co-medications	12,318	211
15	Lipid-lowering medications	5,669	189
16	Effect of day and time of GP visit on billing method	5,876	196
17	Private prescription products	5,774	192
18	Drugs for the treatment of peptic ulcer and reflux	2,856	95
19	Osteoporosis	2,710	90
20	Screening and management of blood cholesterol	2,905	95
21	Diabetes—prevalence, management and screening	2,856	95
22	Asthma—prevalence, severity and management	5,495	95
23	Depression	5,624	196
24	Gastro-oesophageal reflux disease (GORD)	2,767	93

Participating organisations

Organisations providing funding for the BEACH program receive summary reports of the encounter data quarterly and standard reports about their subjects of interest. Analysis of the data is a complex task. The General Practice Statistics and Classification Unit has therefore designed standard report formats that cover most aspects of the subject under investigation. Individual data analyses are conducted where the specific research question is not adequately answered through standard reports.

External purchasers of standard reports

Non-contributing organisations may purchase standard reports or other ad hoc analyses. Charges are available on request. The General Practice Statistics and Classification Unit should be contacted for further information. Contact details are provided at the front of this publication.