

8 Overview of management

The BEACH survey form allowed GPs to record several aspects of patient management for each problem managed at each encounter. Pharmaceutical management was recorded in detail. Other modes of treatment, including clinical treatments (e.g. counselling) and procedures recorded briefly in the GP's own words, were also related to a single problem. Provision was made on the form for referrals and hospital admissions, and for pathology and imaging orders to be related to multiple problems.

GPs undertook a total of 209,460 management activities at a rate of 212 per 100 encounters and 145 per 100 problems managed. The most common management activity was medication prescribed, advised or supplied, at a rate of 104.4 per 100 encounters or 71.3 per 100 problems. Non-pharmacological treatments took place at the rate of 51.4 per 100 encounters, referrals at a rate of 11.6, pathology orders at a rate of 35.2 and imaging at a rate of 8.2 per 100 encounters (Table 8.1).

Table 8.1: Summary of management

Management type	Number	Rate per 100 encounters (n=98,877)	95% LCL	95% UCL	Rate per 100 problems (n=144,674)	95% LCL	95% UCL
Medications	103,210	104.4	102.1	106.7	71.3	70.0	72.7
Prescribed	85,073	86.0	83.6	88.5	58.8	57.3	60.3
Advised OTC	9,649	9.8	9.0	10.6	6.7	6.1	7.2
GP-supplied	8,488	8.6	7.4	9.8	5.9	5.1	6.7
Non-pharmacological treatments	50,775	51.4	48.9	53.8	35.1	33.5	36.7
Clinical	36,211	36.6	34.5	38.8	25.0	23.6	26.4
Procedural	14,564	14.7	14.0	15.5	10.1	9.6	10.6
Referrals	11,495	11.6	11.1	12.1	8.0	7.6	8.3
Specialist	7,775	7.9	7.5	8.2	5.4	5.1	5.6
Allied health	2,600	2.6	2.4	2.9	1.8	1.6	2.0
Hospital	544	0.6	0.3	0.8	0.4	0.2	0.5
Emergency dept	157	0.2	0.0	0.5	0.1	0.0	0.3
Other medical services	138	0.1	0.0	0.6	0.1	0.0	0.4
Other referral	281	0.3	0.0	0.6	0.2	0.0	0.4
Pathology	34,831	35.2	33.7	36.7	24.1	23.1	25.0
Imaging	8,121	8.2	7.8	8.6	5.6	5.4	5.9
Other investigations	1,028	1.0	0.9	1.2	0.7	0.6	0.8
Total management activities	209,460	211.8	—	—	144.7	—	—

Note: LCL—lower confidence limit; UCL—upper confidence limit; OTC—over-the-counter; GP—general practitioner.

Another perspective emerges in analysis of the number of encounters or problems for which at least one form of management was recorded by the GP. At least one management action was recorded at 91.5% of encounters and for 86.8% of problems managed. At least one medication was given at two-thirds (65.6%) of encounters and for 56.6% of problems. At least

one non-pharmacological treatment was given at 39.3% of encounters and for 30.5% of problems, a clinical treatment being more likely than a procedure. A referral was made at 11.0% of encounters and for 8.0% of problems. At least one test or investigation was ordered at 21.3% of encounters and for 16.5% of problems. These were most commonly pathology test orders, which were reported at 15.5% of encounters (for 11.9% of problems). Imaging orders were placed less often, at 7.2% of encounters and for 5.1% of problems (Table 8.2).

Table 8.2: Encounters and problems for which management was recorded

Management type	Number of encounters	Per cent of total encounters ^(a) (n=98,877)	Number of problems	Per cent of total problems ^(a) (n=144,674)
At least one management type	90,445	91.5	125,555	86.8
At least one medication or non-pharmacological treatment	81,367	82.3	108,491	75.0
At least one medication	64,888	65.6	81,940	56.6
At least one prescription	55,112	55.7	69,167	47.8
At least one OTC advised	8,564	8.7	8,709	6.0
At least one GP-supplied	6,470	6.5	6,918	4.8
At least one non-pharmacological treatment	38,837	39.3	44,164	30.5
At least one clinical treatment	28,555	28.9	32,050	22.2
At least one therapeutic procedure	13,149	13.3	13,585	9.4
At least one referral	10,892	11.0	11,535	8.0
At least one referral to a specialist	7,538	7.6	7,881	5.5
At least one referral to allied health	2,505	2.5	2,621	1.8
At least one referral to hospital	544	0.6	572	0.4
At least one referral to emergency dept	157	0.2	162	0.1
At least one referral to other medical services	138	0.1	150	0.1
At least one referral NOS	281	0.3	297	0.2
At least one investigation	21,099	21.3	23,854	16.5
At least one pathology order	15,326	15.5	17,277	11.9
At least one imaging order	7,083	7.2	7,332	5.1
At least one other investigation	987	1.0	1,000	0.7

(a) Figures will not total 100 as multiple events may occur in one encounter or in the management of one problem at encounter.

Note: LCL—lower confidence limit; UCL—upper confidence limit; OTC—over-the-counter; dept—department; NOS—not otherwise specified.

The combinations of management types related to each problem were then investigated. There were 19,119 problems (13.2%) for which no specific management was recorded by the GP. Check-ups (either partial or full) (11.7%), hypertension (8.8%), upper respiratory tract infections (3.8%) and test results (3.3%) together accounted for more than one-quarter of these (results not shown).

The majority of treatments occurred either as a single component or in combination with one other component. Single component management was provided for 63.5% of problems, and double component for 19.9%. More than two components were provided in the management of less than 4% of problems.

Table 8.3 provides a list of the most common problem management combinations (not all combinations shown; no combinations including ‘other investigation’ shown). The most common management choice was medication alone (for 38.9% of problems), followed by clinical treatment alone (9.9%), but the combination of medication and clinical treatment was also relatively frequently recorded (7.6%).

Table 8.3: Most common management combinations

1+ Medication	1+ Clinical treatment	1+ Therapeutic procedure	1+ Referral	1+ Imaging order	1+ Pathology order	Per cent of total encounters (n=98,877)	Per cent of total problems (n=144,674)
No recorded management						8.5	13.2
1+ management recorded						91.5	86.8
✓						33.3	38.9
✓	✓					11.9	7.6
	✓					7.3	9.9
✓					✓	4.0	2.7
✓		✓				3.7	2.3
		✓				3.5	4.1
			✓			3.2	4.0
					✓	2.8	4.5
✓			✓			2.6	1.3
✓	✓				✓	1.7	0.6
				✓		1.7	2.0
✓				✓		1.6	1.0
	✓				✓	1.2	1.1
✓	✓	✓				1.1	0.4
✓	✓		✓			1.1	0.4

Note: 1+—at least one specified management type. Within the top 15 management combinations, there were none containing more than two management components.

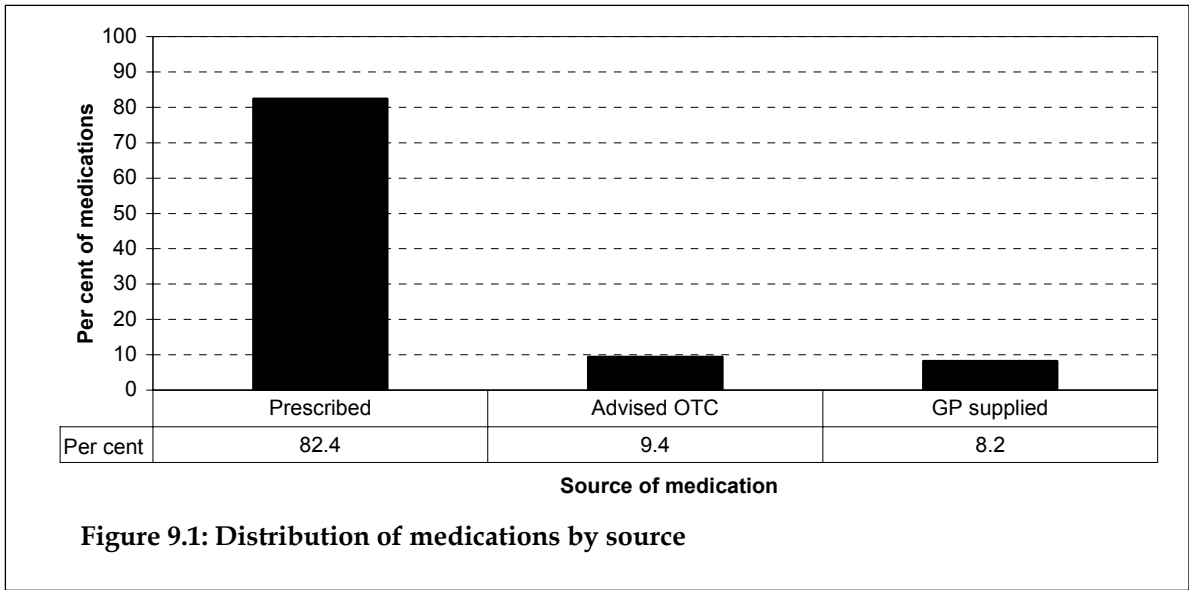
9 Medications

9.1 Source of medications

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. Each medication could be recorded as prescribed (the default), recommended for over-the-counter (OTC) 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 OTC purchase and those 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 (see Chapter 2 – Methods).¹⁹ In all but one table, results are reported at generic level.

Overall, GPs recorded 83.6% of medications by brand (proprietary) name and 16.4% by their generic (non-proprietary) name. Brand names were used for the recording of 85.4% of prescribed medications, 76.6% of GP-supplied medications and 74.1% of OTC advised medications.

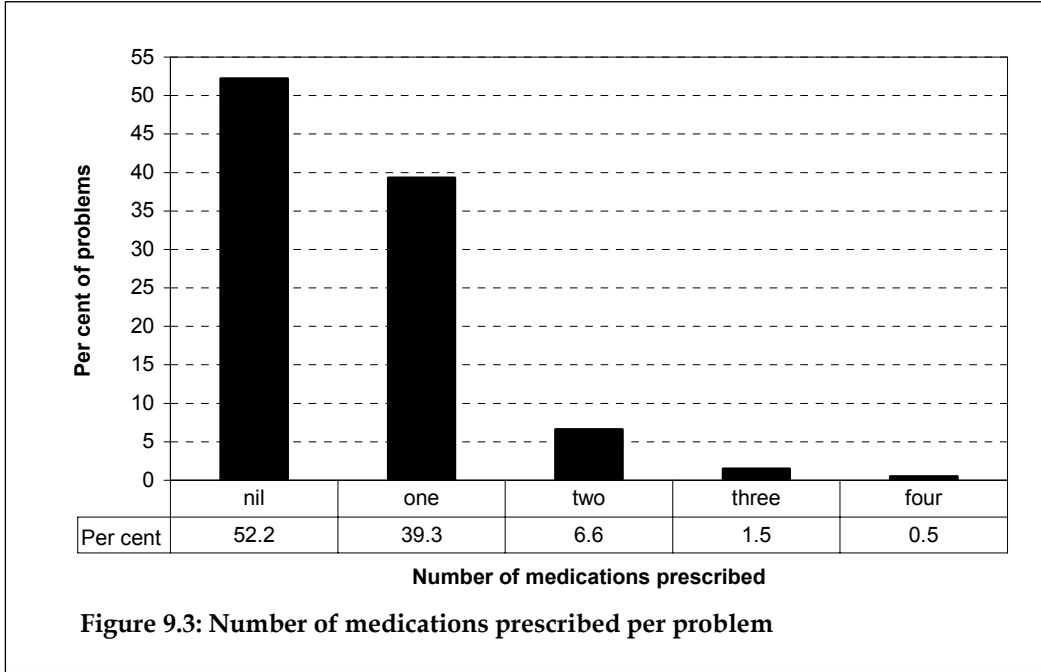
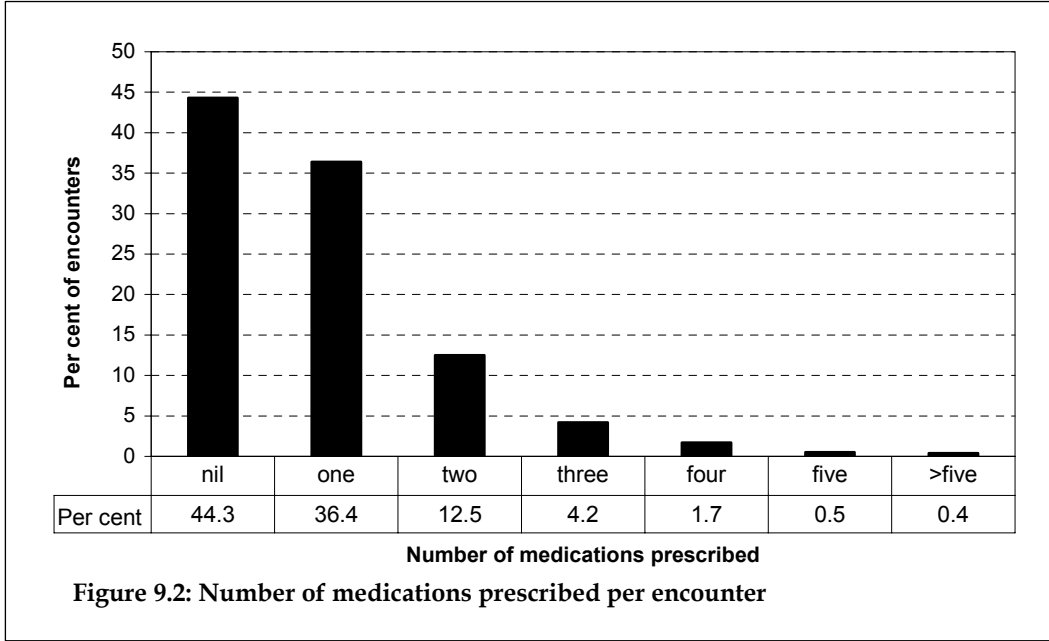
A total of 103,210 medications were recorded at a rate of 104 per 100 encounters and 71 per 100 problems managed. Most medications (82.4%) were prescribed. However, 9.4% of medications were recommended by the GP for OTC purchase, and 8.2% were supplied to the patient by the GP (Figure 9.1). Extrapolated to the 90 million general practice encounters in Australia in 2003–04, GPs prescribed over 77 million medications (not counting repeats) and recommended just under nine million medications to their patients for OTC purchase. GPs also supplied almost eight million medications directly to the patient.



9.2 Prescribed medications

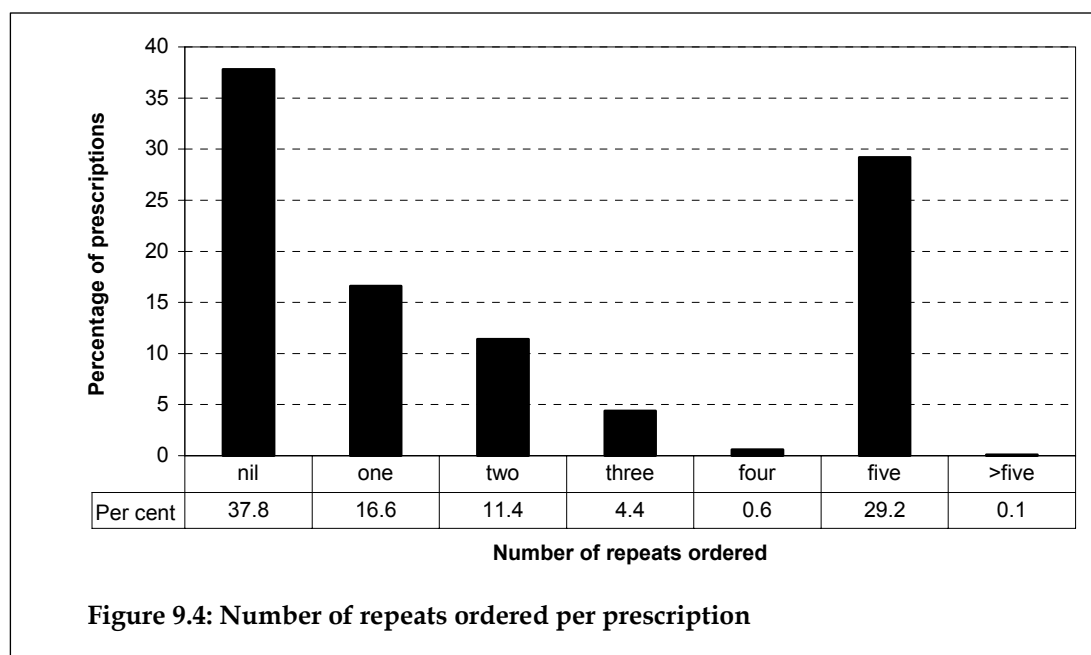
There were 85,073 prescriptions recorded, at a rate of 86.0 per 100 encounters and 58.8 per 100 problems managed. At least one prescription was recorded at 55.7% of encounters and for almost half (47.8%) of the problems managed.

No medications were prescribed at 44.3% of encounters, one medication at 36.4% of encounters, two at 12.5% and three at 4.2%. Four or more medications were prescribed at only 2.6% of encounters (Figure 9.2). No prescription was given for half (52.2%) of all problems managed, one for 39.3%, two for 6.6% and three or more for 2.0% (Figure 9.3).



Number of repeats

GPs were also asked to record the number of repeat prescriptions ordered for each prescribed medication. In previous BEACH years, there was a very high level of missing data in this field (up to 50.0%). However, with an improved instruction sheet, which asked participating GPs to indicate with a zero or dash if there were no repeats, the missing rate dropped to 28.0%. For the 61,234 prescriptions for which data were available, the distribution of the specified number of repeats (from specified zero to 6+) is provided in Figure 9.4. For 37.8% of these prescriptions, the GP specified that no repeats had been prescribed and for 29.2%, five repeats were ordered. The latter proportion reflects the Pharmaceutical Benefits Scheme (PBS) provision of one month's supply and five repeats for many medications used for chronic conditions such as hypertension. The ordering of one or two repeats (16.6% and 11.4%) was also common.



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 are managed for them in general practice.

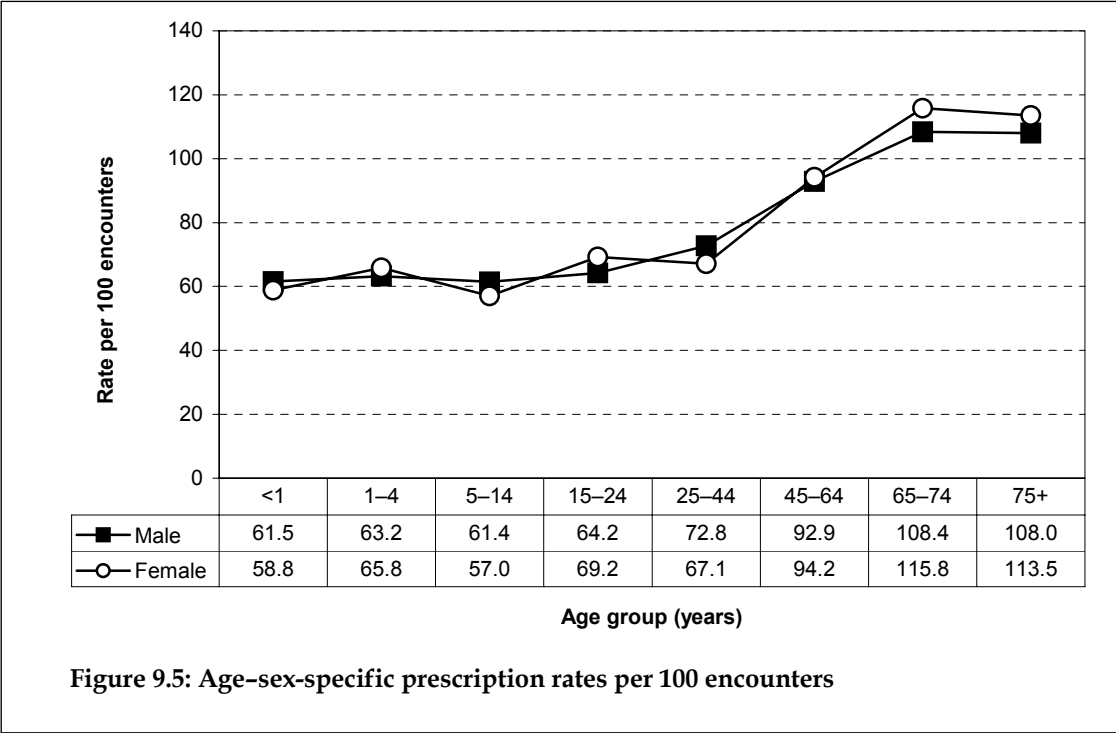


Figure 9.5: Age-sex-specific prescription rates per 100 encounters

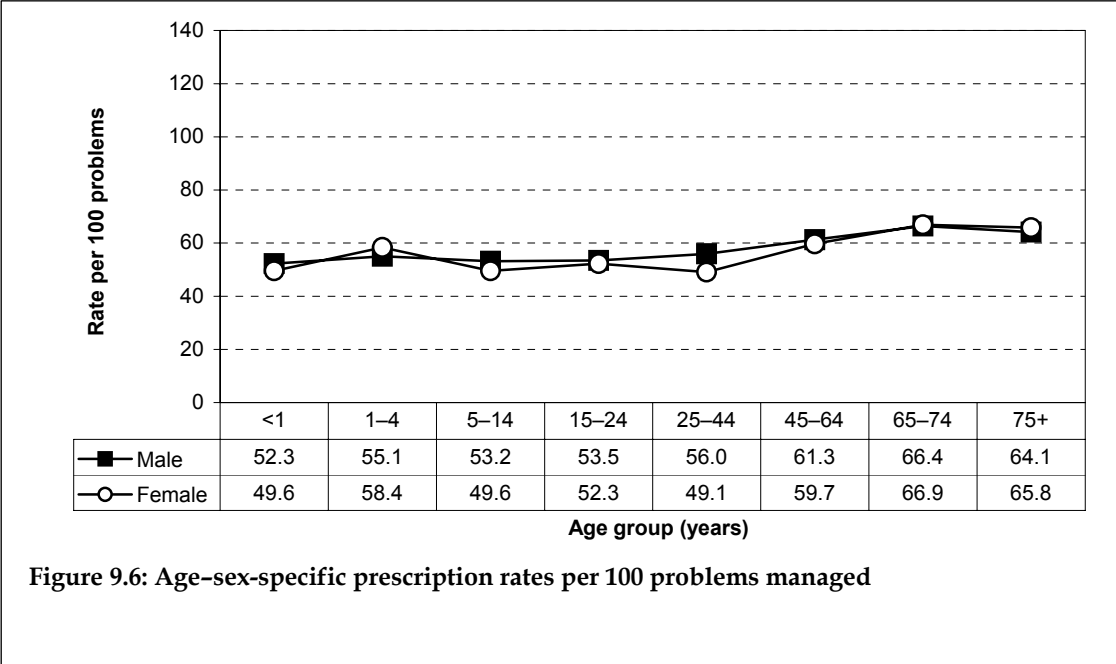


Figure 9.6: Age-sex-specific prescription rates per 100 problems managed

Types of medications prescribed

Medications prescribed by major groups

The distribution of prescribed medications by major groups is presented graphically in Figure 9.7. Cardiovascular medications were the most commonly prescribed group, representing 16.8% of all prescriptions. These were followed by antibiotics (16.5%), central

nervous system (12.2%) and psychological prescriptions (8.8%). Hormones were the fifth most commonly prescribed group (6.6%) followed by musculoskeletal medications (6.5%).

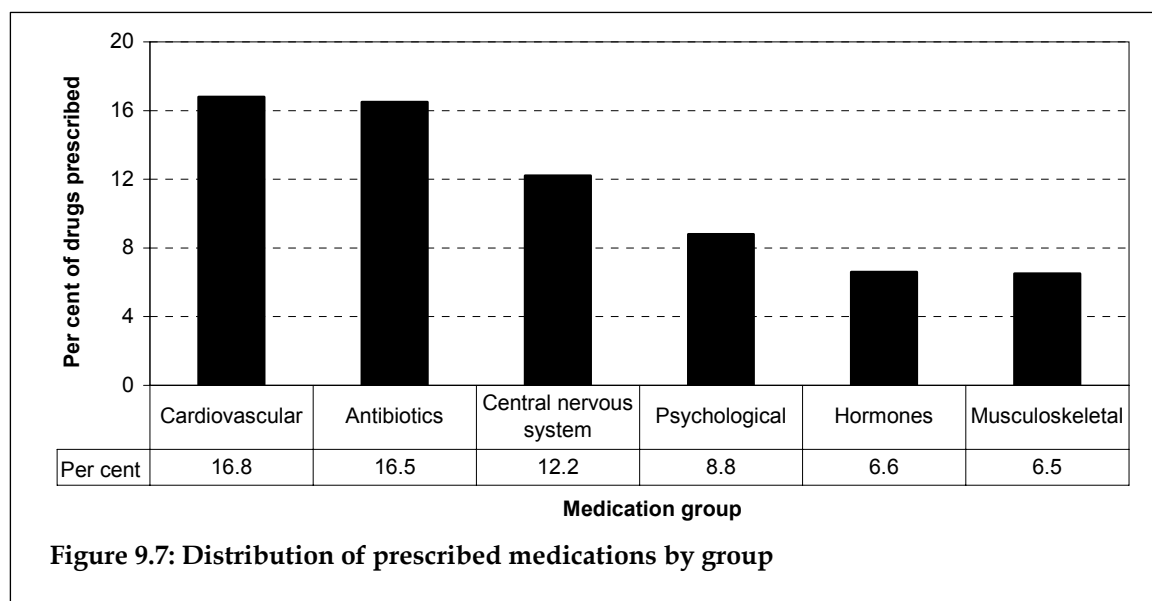


Table 9.1 shows the distribution of medications commonly prescribed by group, subgroup and generic name in order of medication group frequency. The in-house drug classification system CAPS has been used in the analysis of these results. Within cardiovascular medications, anti-hypertensives accounted for more than half the prescriptions (8.1 per 100 encounters). The 'other cardiovascular' group, principally lipid-lowering agents, contributed 2.9 prescriptions per 100 encounters. Beta-blockers were recorded at a rate of 1.7 per 100 encounters.

In the antibiotic group, broad-spectrum penicillins were prescribed at a rate of 5.0 per 100 encounters. Amoxicillin (3.3 per 100 encounters) and amoxicillin + potassium clavulanate (1.7) were the most frequently prescribed generic drugs in that subgroup. Cephalosporins were also prescribed often, at 2.9 per 100 encounters.

Prescribed central nervous system medications were mainly simple analgesics (3.6 per 100 encounters) and compound analgesics (2.5). The psychological medications most frequently prescribed were anti-depressants at a rate of 3.2 per 100 encounters.

Hormones were also commonly prescribed, particularly hypoglycaemics at 2.2 per 100 encounters. In other groups, non-steroidal anti-inflammatories were the most frequently prescribed (4.7 per 100 encounters) of the musculoskeletal medications, and bronchodilator/spasm relaxants (2.2) were the most common in the respiratory group. The wide range of medications prescribed reflects the extensive variety of problems managed in general practice.

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

Group	Subgroup	Generic	Number	Per cent of scripts (n=85,073)	Rate per 100 encls ^(a) (n=98,877)	95% LCL	95% UCL
Cardiovascular			14,277	16.8	14.4	13.6	15.2
	Anti-hypertensive		7,971	9.4	8.1	7.6	8.5
		Irbesartan	872	1.0	0.9	0.7	1.0
		Ramipril	729	0.9	0.7	0.6	0.9
		Perindopril	723	0.9	0.7	0.5	0.9
		Irbesartan/hydrochlorothiazide	713	0.8	0.7	0.5	0.9
		Amlodipine	655	0.8	0.7	0.5	0.8
		Indapamide	451	0.5	0.5	0.3	0.6
	Other CVS drugs		2,833	3.3	2.9	2.7	3.1
		Atorvastatin	1,174	1.4	1.2	1.0	1.3
		Simvastatin	1,031	1.2	1.0	0.9	1.2
	Beta-blockers		1,680	2.0	1.7	1.5	1.9
		Atenolol	948	1.1	1.0	0.8	1.1
		Metoprolol	434	0.5	0.4	0.3	0.6
	Anti-angina		964	1.1	1.0	0.8	1.2
Antibiotics			14,014	16.5	14.2	13.6	14.7
	Broad spectrum penicillin		4,898	5.8	5.0	4.6	5.3
		Amoxicillin	3,217	3.8	3.3	3.0	3.6
		Amoxicillin/potass. clavulanate	1,664	2.0	1.7	1.5	1.9
	Cephalosporins		2,881	3.4	2.9	2.7	3.1
		Cephalexin	1,984	2.3	2.0	1.8	2.2
		Cefaclor monohydrate	818	1.0	0.8	0.5	1.1
	Other antibiotics		2,760	3.2	2.8	2.6	3.0
		Roxithromycin	1,121	1.3	1.1	1.0	1.3
		Erythromycin	548	0.6	0.6	0.3	0.8
		Trimethoprim	452	0.5	0.5	0.3	0.6
	Penicillin		1,314	1.5	1.3	1.2	1.5
	Tetracyclines		851	1.0	0.9	0.7	1.0
		Doxycycline	699	0.8	0.7	0.5	0.9
	Anti-infectives		726	0.9	0.7	0.5	0.9
Central Nervous System			10,408	12.2	10.5	9.9	11.1
	Simple analgesic		3,515	4.1	3.6	3.1	4.0
		Paracetamol	2,830	3.3	2.9	2.4	3.3
		Aspirin	672	0.8	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 (n=85,073)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Psychological	Compound analgesic		2,463	2.9	2.5	2.3	2.7
		Paracetamol/codeine	2,061	2.4	2.1	1.9	2.3
	Narcotic analgesic		2,318	2.7	2.3	2.1	2.6
		Tramadol	939	1.1	0.9	0.8	1.1
		Morphine sulphate	444	0.5	0.4	0.2	0.7
	Anti-emetic/anti-nauseant		1,381	1.6	1.4	1.3	1.5
		Prochlorperazine	665	0.8	0.7	0.5	0.8
		Metoclopramide	621	0.7	0.6	0.5	0.8
	Anti-convulsant		516	0.6	0.5	0.3	0.7
	7,484			8.8	7.6	7.2	8.0
	Anti-depressant		3,158	3.7	3.2	3.0	3.4
		Sertraline	610	0.7	0.6	0.5	0.8
		Citalopram	432	0.5	0.4	0.3	0.6
	Anti-anxiety		1,976	2.3	2.0	1.8	2.2
		Diazepam	1,064	1.3	1.1	0.9	1.3
	Oxazepam	680	0.8	0.7	0.5	0.9	
Hormones	Sedative/hypnotics		1,792	2.1	1.8	1.7	2
		Temazepam	1,193	1.4	1.2	1.1	1.4
	Anti-psychotic		558	0.7	0.6	0.4	0.7
	5,614			6.6	5.7	5.3	6.0
	Hypoglycaemic		2,151	2.5	2.2	1.9	2.4
		Metformin	992	1.2	1.0	0.8	1.2
		Gliclazide	487	0.6	0.5	0.3	0.7
	Sex hormones		1,501	1.8	1.5	1.3	1.7
	Corticosteroids		1,242	1.5	1.3	1.1	1.4
		Prednisolone	529	0.6	0.5	0.3	0.8
Musculoskeletal	Other hormones		704	0.8	0.7	0.6	0.9
		Thyroxine	596	0.7	0.6	0.4	0.8
	5,491			6.5	5.6	5.3	5.8
	Non-steroidal anti-inflammatories		4,654	5.5	4.7	4.5	4.9
		Rofecoxib	993	1.2	1.0	0.9	1.2
		Celecoxib	991	1.2	1.0	0.9	1.1
	Diclofenac sodium systemic	823	1.0	0.8	0.6	1.0	
	Urosuric agents	451	0.5	0.5	0.3	0.6	

(continued)

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

Group	Subgroup	Generic	Number (n=85,073)	Per cent of scripts (n=85,073)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Respiratory			4,570	5.4	4.6	4.3	4.9
	Bronchodilator/spasm relaxant		2,184	2.6	2.2	2	2.4
	Asthma preventives		1,828	2.1	1.8	1.7	2.0
		Salbutamol	1,507	1.8	1.5	1.4	1.7
		Fluticasone/salmeterol	808	1.0	0.8	0.7	1.0
Digestive			4,158	4.9	4.2	4.0	4.4
	Anti-ulcerants		2,714	3.2	2.7	2.6	2.9
		Omeprazole	686	0.8	0.7	0.6	0.8
		Esomeprazole	610	0.7	0.6	0.4	0.8
	Anti-diarrhoeals		473	0.6	0.5	0.3	0.6
Skin			3,842	4.5	3.9	3.7	4.1
	Topical steroid		2,552	3.0	2.6	2.4	2.8
		Betamethasone topical	826	1.0	0.8	0.7	1.0
		Mometasone	523	0.6	0.5	0.4	0.7
		Hydrocortisone topical	445	0.5	0.4	0.3	0.6
	Anti-infective skin		677	0.8	0.7	0.6	0.8
	Other skin		588	0.7	0.6	0.4	0.8
Allergy, immune system			3,771	4.4	3.8	3.4	4.2
	Immunisation		3,282	3.9	3.3	2.9	3.7
		Influenza virus vaccine	1,185	1.4	1.2	0.4	2.0
Blood			2,062	2.4	2.1	1.9	2.3
	Other blood drug		1,218	1.4	1.2	1.0	1.4
		Warfarin sodium	877	1.0	0.9	0.7	1.1
	Haemopoietic		841	1.0	0.9	0.7	1.0
		Vitamin B12 (cobalamin)	442	0.5	0.4	0.3	0.6
Urogenital			1,825	2.1	1.8	1.7	2.0
	Diuretic		1,081	1.3	1.1	0.9	1.3
		Frusemide (furosemide)	667	0.8	0.7	0.5	0.8
Contraceptives			1,736	2.0	1.8	1.6	1.9
	Contraceptives oral/systemic		1,728	2.0	1.7	1.6	1.9
		Levonorgestrel/ethinyloestradiol	1,144	1.3	1.2	1.0	1.3
Nutrition, metabolism			1,616	1.9	1.6	1.5	1.8
	Minerals/tonics		533	0.6	0.5	0.4	0.7
	Nutrition/metabolism other		539	0.6	0.5	0.4	0.7

(continued)

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

Group	Subgroup	Generic	Number	Per cent of scripts (n=85,073)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Eye medications			1,653	1.9	1.7	1.5	1.8
	Anti-infectives eye		1,036	1.2	1.0	0.9	1.2
		Chloramphenicol eye	893	1.0	0.9	0.8	1.0
	Other eye medication		448	0.5	0.5	0.3	0.6
Ear, nose topical			1,620	1.9	1.6	1.5	1.8
	Topical otic		894	1.1	0.9	0.7	1.1
		Dexamethasone/framycetin	451	0.5	0.5	0.3	0.7
	Topical nasal		726	0.9	0.7	0.5	0.9
Anti-neoplastics			417	0.5	0.4	0.3	0.6
Miscellaneous			336	0.4	0.3	0.1	0.6
Surgical preparations			116	0.1	0.1	0.0	0.5
Diagnostic agents			65	0.1	0.1	0.0	0.4

(a) Column will not add to 100 because multiple prescriptions could be written at each encounter and only the most frequent subgroups and generic drugs are included.

Note: Scripts—prescriptions; encs—encounters; LCL—lower confidence limit; UCL—upper confidence limit; CVS—cardiovascular system.

Most frequently prescribed medications

The most frequently prescribed individual medications are reported at the generic level in Table 9.2. Together, these 30 medications accounted for more than half (55.1%) of all prescribed medications. Amoxicillin was the most frequently prescribed at a rate of 3.3 per 100 encounters. Antibiotics accounted for three of the top five medications.

Table 9.2: Most frequently prescribed medications (generic level)

Generic medication	Number	Per cent of scripts (n=85,073)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Amoxicillin	3,217	3.8	3.3	3.0	3.6
Paracetamol	2,830	3.3	2.9	2.4	3.3
Paracetamol/codeine	2,061	2.4	2.1	1.9	2.3
Cephalexin	1,984	2.3	2.0	1.8	2.2
Amoxicillin/potass. clavulanate	1,664	2.0	1.7	1.5	1.9
Salbutamol	1,507	1.8	1.5	1.4	1.7
Temazepam	1,193	1.4	1.2	1.1	1.4
Influenza virus vaccine	1,185	1.4	1.2	0.4	2.0
Atorvastatin	1,174	1.4	1.2	1.0	1.3
Levonorgestrel/ethinylloestradiol	1,144	1.3	1.2	1.0	1.3
Roxithromycin	1,121	1.3	1.1	1.0	1.3
Diazepam	1,064	1.3	1.1	0.9	1.3

(continued)

Table 9.2 (continued): Most frequently prescribed medications (generic level)

Generic medication	Number	Per cent of scripts (n=85,073)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Simvastatin	1,031	1.2	1.0	0.9	1.2
Rofecoxib	993	1.2	1.0	0.9	1.2
Metformin	992	1.2	1.0	0.8	1.2
Celecoxib	991	1.2	1.0	0.9	1.1
Atenolol	948	1.1	1.0	0.8	1.1
Tramadol	939	1.1	0.9	0.8	1.1
Chloramphenicol eye	893	1.0	0.9	0.8	1.0
Warfarin sodium	877	1.0	0.9	0.7	1.1
Irbesartan	872	1.0	0.9	0.7	1.0
Betamethasone topical	826	1.0	0.8	0.7	1.0
Diclofenac sodium systemic	823	1.0	0.8	0.6	1.0
Cefaclor monohydrate	818	1.0	0.8	0.5	1.1
Fluticasone/salmeterol	808	1.0	0.8	0.7	1.0
Ramipril	729	0.9	0.7	0.6	0.9
Perindopril	723	0.9	0.7	0.5	0.9
Irbesartan/hydrochlorothiazide	713	0.8	0.7	0.5	0.9
Doxycycline	699	0.8	0.7	0.5	0.9
Omeprazole	686	0.8	0.7	0.6	0.8
<i>Subtotal</i>	<i>46,919</i>	<i>55.1</i>	—	—	—
Total prescribed medications	85,073	100.0	86.0	83.6	88.5

(a) Column will not add to 100 because multiple prescriptions could be written at each encounter and only the most frequently prescribed medications are included in this table.

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

Most commonly prescribed medications at generic and proprietary level

As stated at the beginning of this section, GPs specify about 85% of their prescriptions at the brand name or proprietary level. When medications were analysed at the CAPS product level, only one medication described in generic terms was recorded at sufficient frequency to rate in the top 20. This was paracetamol (Table 9.3). Other medications described in generic terms in the top 30% were temazepam, polio sabin and amoxicillin (results not shown).

Table 9.3: Most frequently prescribed medications (product level)

Medications	Number	Per cent of scripts (n=85,073)
Panadeine forte tablets 530 mg	1,817	2.14
Panamax tablets 500 mg	1,258	1.48
Keflex pulvules 500 mg	1,069	1.26
Augmentin duo forte tablets 875 mg	1,047	2.3
Fluvax injection 0.5 ml	1,020	1.20
Amoxil capsules 500 mg	943	1.11
Ventolin inhaler 100 mcg	857	1.01
Celebrex capsules 200 mg	845	0.99
Vioxx NOS	767	0.90
Voltaren tablets 50 mg	616	0.72
Stemetil tablets 5 mg	531	0.62
Panadol NOS	527	0.62
Paracetamol NOS	496	0.58
Rulide tablets 300 mg	473	0.56
Losec tablets 20 mg	473	0.56
Lipitor tablets 20 mg	447	0.53
Ceclor cd tablet 375 mg	433	0.51
Coversyl tablets 4 mg	427	0.50
Noten tablets 50 mg	423	0.50
Rulide tablets 150 mg	421	0.49
<i>Subtotal</i>	<i>14,890</i>	<i>17.5</i>
Total prescribed medications	85,073	100.0

Note: Scripts—prescriptions; NOS—not otherwise specified; LCL—lower confidence limit; UCL—upper confidence limit.

Distribution of prescribed medications using the ATC classification

Table 9.4 shows the distribution of prescribed medications using the WHO ATC classification.¹⁹ This allows comparison with other data classified in ATC such as those produced by the HIC for PBS data. Analysis by ATC groupings found that nervous system medications, which include analgesic and psychiatric medicines, were the most commonly recorded in BEACH.

Table 9.4: Distribution of prescribed medications, by ATC levels 1, 3 and 5

ATC Level 1	ATC Level 3	ATC Level 5	Number	Per cent of scripts (n=85,073)	Rate per 100 encls ^(a) (n=98,877)	95% LCL	95% UCL
Nervous system			17,694	20.8	17.9	17.1	18.7
	Other analgesics and anti-pyretics		5,698	6.7	5.8	5.3	6.2
		Paracetamol	2,830	3.3	2.9	2.4	3.3
		Paracetamol, combinations excl. psycholeptics	2,182	2.6	2.2	2.0	2.4
		Acetylsalicylic acid	672	0.8	0.7	0.5	0.9
	Anti-depressants		3,158	3.7	3.2	3.0	3.4
		Sertraline	610	0.7	0.6	0.5	0.8
		Citalopram	432	0.5	0.4	0.3	0.6
	Opioids		2,435	2.9	2.5	2.2	2.7
		Tramadol	939	1.1	0.9	0.8	1.1
		Morphine	500	0.6	0.5	0.3	0.7
	Anxiolytics		1,976	2.3	2.0	1.8	2.2
		Diazepam	1,064	1.3	1.1	0.9	1.3
		Oxazepam	680	0.8	0.7	0.5	0.9
	Hypnotics and sedatives		1,788	2.1	1.8	1.6	2.0
		Temazepam	1,193	1.4	1.2	1.1	1.4
	Anti-psychotics		1,227	1.4	1.2	1.1	1.4
		Prochlorperazine	665	0.8	0.7	0.5	0.8
	Anti-epileptics		529	0.6	0.5	0.3	0.7
Anti-infectives for systemic use			17,145	20.2	17.3	16.7	18.0
	Beta-lactam anti-bacterials, penicillins		6,156	7.2	6.2	5.9	6.6
		Amoxicillin	3,217	3.8	3.3	3.0	3.6
		Amoxicillin and enzyme inhibitor	1,664	2.0	1.7	1.5	1.9
		Phenoxymethyl penicillin	520	0.6	0.5	0.3	0.7
	Other beta-lactam anti-bacterials		2,881	3.4	2.9	2.7	3.1
		Cefaclor	818	1.0	0.8	0.5	1.1
		Cefalexin	1,984	2.3	2.0	1.8	2.2
	Macrolides, lincosamides and streptogramins		2,089	2.5	2.1	1.9	2.3
		Roxithromycin	1,121	1.3	1.1	1.0	1.3
		Erythromycin	548	0.6	0.6	0.3	0.8
	Viral vaccines		2,027	2.4	2.1	1.7	2.4
		Influenza, inactivated, whole virus	1,185	1.4	1.2	0.4	2.0

(continued)

Table 9.4 (continued): Distribution of prescribed medications, by ATC levels 1, 3 and 5

ATC Level 1	ATC Level 3	ATC Level 5	Number	Per cent of scripts (n=85,073)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
	Bacterial vaccines		1,067	1.3	1.1	0.9	1.3
	Tetracyclines		851	1.0	0.9	0.7	1.0
		Doxycycline	699	0.8	0.7	0.5	0.9
	Sulfonamides and trimethoprim		714	0.8	0.7	0.6	0.9
		Trimethoprim	452	0.5	0.5	0.3	0.6
	Other anti-bacterials		509	0.6	0.5	0.4	0.7
Cardiovascular system			15,050	17.7	15.2	14.4	16.1
	Cholesterol and triglyceride reducers		2,732	3.2	2.8	2.6	3.0
		Atorvastatin	1,174	1.4	1.2	1.0	1.3
		Simvastatin	1,031	1.2	1.0	0.9	1.2
	ACE inhibitors, plain		2,503	2.9	2.5	2.3	2.7
		Ramipril	729	0.9	0.7	0.6	0.9
		Perindopril	723	0.9	0.7	0.5	0.9
	Beta-blocking agents		1,788	2.1	1.8	1.6	2.0
		Atenolol	948	1.1	1.0	0.8	1.1
		Metoprolol	434	0.5	0.4	0.3	0.6
	Selective calcium channel blockers with mainly vascular effects		1,447	1.7	1.5	1.3	1.6
		Amlodipine	655	0.8	0.7	0.5	0.8
	Selective calcium channel blockers with direct cardiac effects		687	0.8	0.7	0.5	0.8
	High-ceiling diuretics		684	0.8	0.7	0.5	0.9
		Furosemide	667	0.8	0.7	0.5	0.8
	Vasodilators used in cardiac disease		646	0.8	0.7	0.4	0.9
	Low-ceiling diuretics, excl. thiazides		470	0.6	0.5	0.3	0.6
		Indapamide	451	0.5	0.5	0.3	0.6
	ACE inhibitors, combinations		530	0.6	0.5	0.4	0.7
Alimentary tract and metabolism			8,014	9.4	8.1	7.7	8.5
	Drugs for peptic ulcer and GORD		2,740	3.2	2.8	2.6	3.0
		Omeprazole	686	0.8	0.7	0.6	0.8
		Esomeprazole	610	0.7	0.6	0.4	0.8
	Oral blood glucose lowering drugs		1,832	2.2	1.9	1.6	2.1
		Metformin	992	1.2	1.0	0.8	1.2
		Gliclazide	487	0.6	0.5	0.3	0.7
	Propulsives		719	0.8	0.7	0.6	0.9
		Metoclopramide	621	0.7	0.6	0.5	0.8

(continued)

Table 9.4 (continued): Distribution of prescribed medications, by ATC levels 1, 3 and 5

ATC Level 1	ATC Level 3	ATC Level 5	Number	Per cent of scripts (n=85,073)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Musculoskeletal system			5,955	7.0	6.0	5.7	6.3
	Anti-inflammatory and anti-rheumatic products, non-steroids		4,676	5.5	4.7	4.5	5.0
		Diclofenac	1,060	1.2	1.1	0.9	1.3
		Rofecoxib	993	1.2	1.0	0.9	1.2
		Celecoxib	991	1.2	1.0	0.9	1.1
	Anti-gout preparations		451	0.5	0.5	0.3	0.6
	Drugs affecting bone structure and mineralization		442	0.5	0.4	0.3	0.6
Respiratory system			5,729	6.7	5.8	5.5	6.1
	Adrenergics, inhalants		2,774	3.3	2.8	2.6	3.0
		Salbutamol	1,466	1.7	1.5	1.3	1.6
		Salmeterol with other drugs for obstructive airway disease	808	1.0	0.8	0.7	1.0
	Other drugs for obstructive airway disease, inhalants		1,190	1.4	1.2	1.1	1.4
	Decongestants and other nasal preparations for topical use		730	0.9	0.7	0.5	0.9
	Anti-histamines for systemic use		475	0.6	0.5	0.3	0.7
Dermatologicals			4,007	4.7	4.1	3.8	4.3
	Corticosteroids, plain		2,368	2.8	2.4	2.2	2.6
		Betamethasone	826	1.0	0.8	0.7	1.0
		Mometasone	523	0.6	0.5	0.4	0.7
		Hydrocortisone	445	0.5	0.4	0.3	0.6
Genitourinary system and sex hormones			3,929	4.6	4.0	3.7	4.2
	Hormonal contraceptives for systemic use		2,152	2.5	2.2	2.0	2.4
		Levonorgestrel and oestrogen	1,144	1.3	1.2	1.0	1.3
	Oestrogens		628	0.7	0.6	0.5	0.8
Sensory organs			2,548	3.0	2.6	2.4	2.7
	Anti-infectives ophthalmological		1,036	1.2	1.0	0.9	1.2
		Chloramphenicol	893	1.0	0.9	0.8	1.0
	Corticosteroids with anti-infectives otological		679	0.8	0.7	0.5	0.9
		Dexamethasone with anti-infectives	451	0.5	0.5	0.3	0.7
Blood and blood-forming organs			2,205	2.6	2.2	2.0	2.4
	Anti-thrombotic agents		1,301	1.5	1.3	1.1	1.5
		Warfarin	877	1.0	0.9	0.7	1.1
	Vitamin B12 and folic acid		558	0.7	0.6	0.4	0.7
		Cyanocobalamin	442	0.5	0.4	0.3	0.6

(continued)

Table 9.4 (continued): Distribution of prescribed medications, by ATC levels 1, 3 and 5

ATC Level 1	ATC Level 3	ATC Level 5	Number (n=85,073)	Per cent of scripts	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Systemic hormonal preparations, excl. sex hormones and insulins			1,914	2.3	1.9	1.8	2.1
	Corticosteroids for systemic use, plain		1,205	1.4	1.2	1.0	1.4
		Prednisolone	685	0.8	0.7	0.5	0.9
	Thyroid preparations		597	0.7	0.6	0.4	0.8
		Levothyroxine sodium	596	0.7	0.6	0.4	0.8
Anti-neoplastic and immunomodulating agents			414	0.5	0.4	0.3	0.6
Various			353	0.4	0.4	0.1	0.6
Anti-parasitic products, insecticides and repellents			118	0.1	0.1	0.0	0.4

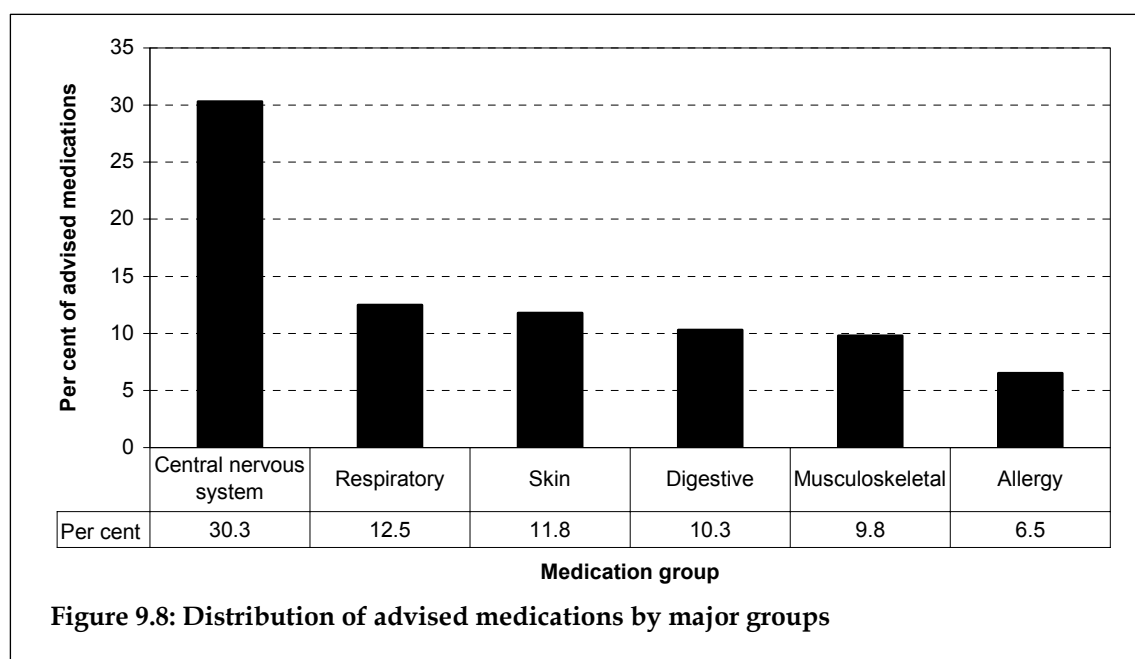
(a) Column will not add to 100 because multiple prescriptions could be written at each encounter and only the most frequent Level 3 and Level 5 drugs are included.

Note: Scripts—prescriptions; encs—encounters; LCL—lower confidence limit; UCL—upper confidence limit; GORD—gastro-oesophageal reflux disease; ACE—angiotensin converting enzyme.

9.3 Medications advised for over-the-counter purchase

The total number of medications recorded as recommended by the GP for OTC purchase was 9,649, a rate of 9.8 per 100 encounters and 6.7 per 100 problems managed. At least one medication was recorded as advised at 8.7% of encounters and for 6.0% of problems.

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 medications acting on the respiratory system (Figure 9.8).



Paracetamol was the most frequently advised medication, accounting for 25.2% of all advised OTC medications (Table 9.5). There was a wide range of medications advised in relatively small numbers, including analgesics, and cold and skin preparations. The 30 medications listed in this table accounted for two-thirds of all OTC medications advised.

Table 9.5: Most frequently advised over-the-counter medications

Generic medication	Number	Per cent of OTCs (n=9,649)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Paracetamol	2,432	25.2	2.5	1.9	3.0
Ibuprofen	543	5.6	0.5	0.2	0.9
Loratadine	219	2.3	0.2	0.0	0.5
Diclofenac topical	219	2.3	0.2	0.0	0.6
Clotrimazole topical	195	2.0	0.2	0.0	0.4
Aspirin	154	1.6	0.2	0.0	0.5
Fexofenadine	135	1.4	0.1	0.0	0.5
Paracetamol/codeine	129	1.3	0.1	0.0	0.5
Saline bath/solution/gargle	128	1.3	0.1	0.0	0.7
Sodium/potassium/citric/glucose	115	1.2	0.1	0.0	0.6
Clotrimazole vaginal	115	1.2	0.1	0.0	0.4
Cetirizine	108	1.1	0.1	0.0	0.5
Sodium chloride topical nasal	107	1.1	0.1	0.0	0.5
Sodium bicarbonate/citrate/tartaric/citric	105	1.1	0.1	0.0	0.6
Chlorpheniramine/pseudoephedrine	101	1.0	0.1	0.0	0.5
Brompheniramine/phenylephrine	99	1.0	0.1	0.0	0.7
Cold and flu medication NEC	96	1.0	0.1	0.0	1.0
Chlorpheniramine/phenylephrine	90	0.9	0.1	0.0	0.6
Sorbolene/glycerol/cetomac	90	0.9	0.1	0.0	0.4
Loperamide	89	0.9	0.1	0.0	0.5
Simple analgesic	86	0.9	0.1	0.0	0.9
Povidone-iodine topical	82	0.9	0.1	0.0	0.6
Codeine/paracetamol/pseudoephedrine	82	0.8	0.1	0.0	0.8
Mouthwash/gargle other	81	0.8	0.1	0.0	1.0
Folic acid	81	0.8	0.1	0.0	0.4
Promethazine hydrochloride	79	0.8	0.1	0.0	0.4
Calamine lotion	76	0.8	0.1	0.0	0.5
Benzydamine oropharyngeal	72	0.7	0.1	0.0	0.5
Glucosamine	70	0.7	0.1	0.0	0.4
Psyllium hydrophilic mucilloid	70	0.7	0.1	0.0	0.4
<i>Subtotal</i>	6,556	67.5	—	—	—
Total medications advised	9,649	100.0	9.8	9.0	10.6

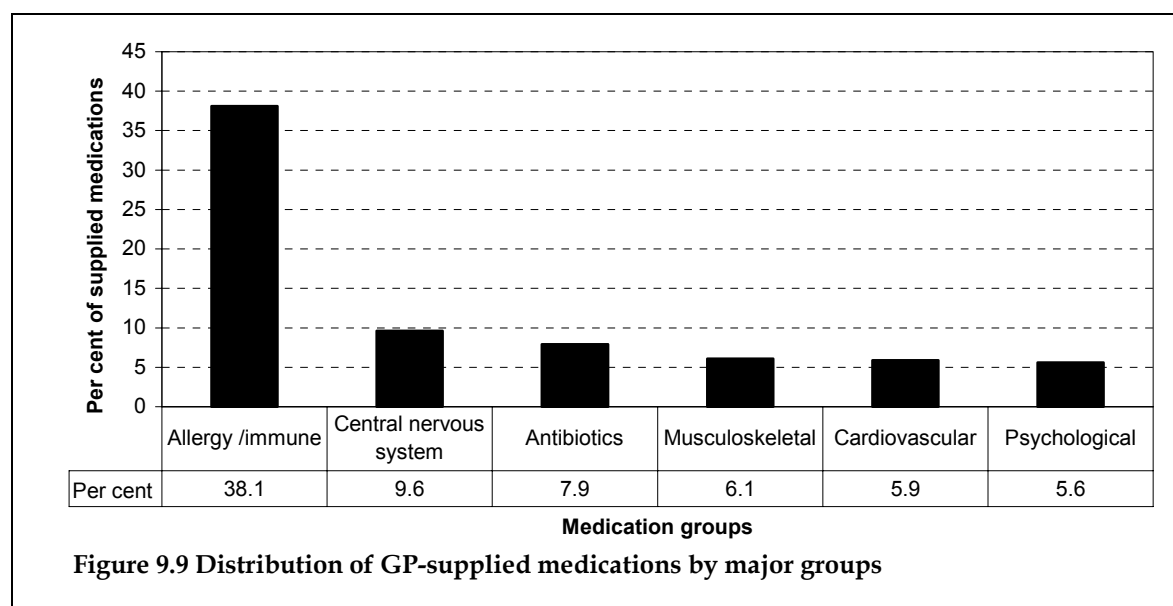
(a) Column will not add to 100 because multiple medications could be given at each encounter and only the medications most frequently advised for over-the-counter purchase are included.

Note: OTCs—over-the-counter medications; encs—encounters; LCL—lower confidence limit; UCL—upper confidence limit.

9.4 Medications supplied by GPs

GPs supplied their patients with a total of 8,488 medications in this study, at a rate of 8.6 medications per 100 encounters and 5.9 per 100 problems. At least one medication was supplied at 6.5% of encounters for 4.8% of problems.

The distribution of supplied medications by group showed that those acting on the allergy/immune system constituted 38.1% of all medications supplied. Central nervous system medications made up 9.6%, and antibiotics accounted for 7.9% of GP-supplied medications (Figure 9.9).



Of the ten most common medications supplied by the GP, seven were vaccines, principally influenza virus vaccine, which accounted for 13.5% of GP-supplied medications (Table 9.6). There was a wide spread of other medications supplied, mostly prescription medications. Presumably some were from manufacturers' sample packs and may have been supplied to test efficacy for a particular patient, or where cost is an issue. Others may have been supplied to meet an urgent need. The medications most commonly supplied were amoxycillin and metoclopramide, accounting for 2.3% and 2.1% respectively of all medications supplied.

Table 9.6: Medications most frequently supplied by GPs

Generic medication	Number	Per cent of GP-supplied (n=8,488)	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL
Influenza virus vaccine	1,150	13.5	1.2	0.0	2.6
Polio vaccine oral sabin/injection	337	4.0	0.3	0.1	0.6
Meningitis vaccine	250	2.9	0.3	0.0	0.6
Amoxycillin	196	2.3	0.2	0.0	2.5
Triple antigen(Diphtheria/pertussis/tetanus)	191	2.2	0.2	0.0	0.5
Mumps/measles/rubella vaccine	185	2.2	0.2	0.0	0.5
Diphtheria/pertussis/tetanus/hepatitis B	182	2.1	0.2	0.0	0.6

(continued)

Table 9.6 (continued): Medications most frequently supplied by GPs

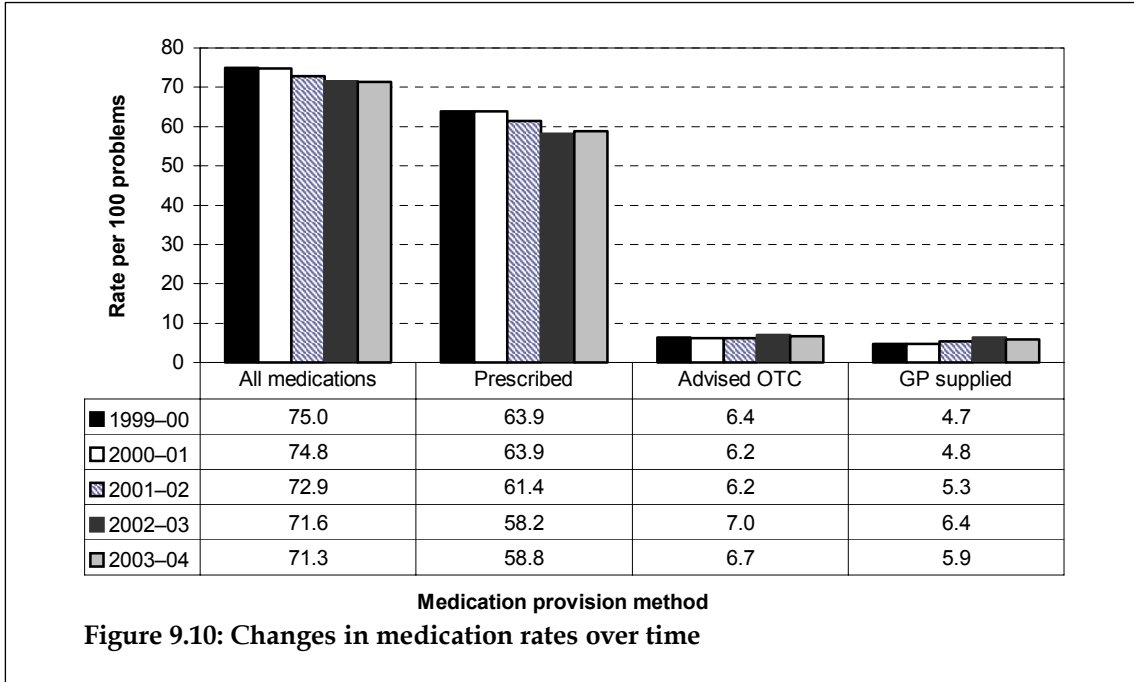
Generic medication	Number	Per cent of GP-supplied (n=8,488)	Rate per 100 encs^(a) (n=98,877)	95% LCL	95% UCL
Metoclopramide	180	2.1	0.2	0.0	0.6
Haemophilus B vaccine	173	2.0	0.2	0.0	0.5
Meloxicam	151	1.8	0.2	0.0	0.7
ADT/CDT (diphtheria/tetanus) vaccine	148	1.7	0.1	0.0	0.4
Rofecoxib	145	1.7	0.1	0.0	0.5
Paracetamol	136	1.6	0.1	0.0	1.4
Hepatitis B vaccine	126	1.5	0.1	0.0	0.6
Vitamin B12 (cobalamin)	113	1.3	0.1	0.0	0.5
Salbutamol	107	1.3	0.1	0.0	0.6
Celecoxib	96	1.1	0.1	0.0	0.4
Pneumococcal vaccine	95	1.1	0.1	0.0	0.8
Prochlorperazine	94	1.1	0.1	0.0	0.6
Esomeprazole	88	1.0	0.1	0.0	0.4
Paracetamol/codeine	82	1.0	0.1	0.0	0.8
Promethazine hydrochloride	74	0.9	0.1	0.0	0.9
Cephalexin	72	0.8	0.1	0.0	0.9
Methylprednisolone	71	0.8	0.1	0.0	3.9
Levonorgestrel/ethinyloestradiol	69	0.8	0.1	0.0	0.7
Tramadol	67	0.8	0.1	0.0	0.5
Amoxicillin/potass. clavulanate	67	0.8	0.1	0.0	0.9
Sertraline	60	0.7	0.1	0.0	0.5
Chloramphenicol eye	58	0.7	0.1	0.0	1.3
Haemophilus B/hepatitis B vaccine	57	0.7	0.1	0.0	0.7
<i>Subtotal</i>	<i>4,820</i>	<i>56.8</i>	<i>—</i>	<i>—</i>	<i>—</i>
Total medications supplied	8,488	100.0	8.6	7.4	9.8

(a) Column will not add to 100 because multiple medications could be given at each encounter and only the medications most frequently supplied by GPs are included.

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

9.5 Changes from 1999–00 to 2003–04

There has been a significant decrease in overall medication rates, from 110.1 per 100 encounters (95% CI: 107.8–112.4) in 1999–00 to 104.4 (95% CI: 102.1–106.7) in 2003–04. The decrease in total medications was reflected particularly in the rates of prescribed medications which fell from 93.6 (95% CI: 91.2–96.1) per 100 encounters in 1999–00 to 86.0 (95% CI: 83.6–88.5) in 2003–04. The rate of advised OTC medications and those supplied by the GP showed no significant changes or trends over this period (Appendix 5, Table A5.2). Figure 9.10 provides a graphical view of the changes in medication rates per 100 problems managed over time. The graph demonstrates that decreased prescribing rates are not due to any decrease in total problem management rates.



Changes in prescribed medications (classified in CAPS)

Appendix 5, Table A5.9 provides a summary of the annual results for prescribed medications, classified according to CAPS. A number of significant changes can be seen between 2003–04 and some of the earlier years. There has been a significant decline in prescribing rates of:

- total antibiotics, in particular cephalosporins, tetracyclines and ‘other’ antibiotics (which include macrolides)
- compound analgesics
- total respiratory medications, including bronchodilators and asthma preventives
- sex hormones
- total musculoskeletal medications, including NSAIDs and anti-rheumatoids
- total allergy, immune system medications, particularly immunisation
- total skin medications
- ear and nose topical medications, and topical nasal medications in particular.

A significant increase in 2003–04 prescribing rates of:

- narcotic analgesics

- medications for ulcers of the digestive system
- blood medications and particularly 'other' blood drugs which include all except haemopoietics
- medications relating to nutrition and metabolism, which include vitamins, supplements and anti-obesity drugs.

Changes in prescription rates of individual generic medications

Appendix 5, Table A5.10 shows the most frequently prescribed medications for each of the years from 1999–00 to 2003–04. Between 2003–04 and some of the earlier years significant decreases in prescribing rates of the following medications were noted:

- paracetamol
- salbutamol
- cefaclor monohydrate
- roxithromycin.
- diclofenac sodium systemic
- ranitidine
- celecoxib (from a peak in 2000–01)

Medications which increased significantly from any of the earlier years to 2003–04 were:

- atorvastatin
- tramadol
- rofecoxib (from its introduction in 2000–01)
- fluticasone/salmeterol.

Changes in prescribed medications (classified in ATC)

The comparative results for prescribed medication rates using the ATC classification are presented in Appendix 5, Table A5.11.

In comparison to some of the earlier years, 2003–04 demonstrated significant decreases in prescribing rates of:

- other analgesics and anti-pyretics
- anti-inflammatory/anti-rheumatic non-steroids
- other beta-lactam anti-bacterials
- plain ACE inhibitors
- macrolides/lincosamides/streptogramins
- other inhalants for obstructive airway diseases

Significant increases were apparent in the rate of prescribing of:

- cholesterol and triglyceride reducers
- opioids.

Changes in rates of advice or supply of individual generic medications

As shown in Appendix 5, Tables A5.12 and A5.13, there were no significant changes in the rates of provision of advice for OTC purchase nor the rate of GP direct supply of individual medications.

10 Non-pharmacological management

The survey form allowed GPs to record up to two non-pharmacological treatments for each problem managed at the encounter. Non-pharmacological treatments included all clinical and procedural treatments provided by the GPs at the encounters. These groups are defined in Appendix 3.

Clinical treatments include general and specific advice, counselling or education, family planning, and administrative processes. Procedural treatments involve all procedures carried out by GPs, such as excision of skin lesion or application/removal of plaster.

Observations of the patient that were regarded as routine clinical measurements, such as measurements of blood pressure, were not included.

10.1 Number of non-pharmacological treatments

Non-pharmacological treatments were frequently provided by GPs to manage patient morbidity. A total of 50,775 were recorded for the year, at a rate of 51.4 per 100 encounters and 35.1 per 100 problems managed. GPs provided more clinical treatments (25.0 per 100 problems) than procedural treatments (10.1 per 100 problems) (Table 10.1).

Table 10.1: Non-pharmacological treatments – summary table

	Number	Rate per 100 encs ^(a) (n=98,877)	95% LCL	95% UCL	Rate per 100 problems ^(a) (n=144,674)	95% LCL	95% UCL
Non-pharmacological treatments	50,775	51.4	48.9	53.8	35.1	33.5	36.7
Clinical treatments	36,211	36.6	34.5	38.8	25.0	23.6	26.4
Procedural treatments	14,564	14.7	14.0	15.5	10.1	9.6	10.6

(a) Figures do not total 100 as more than one treatment can be described at each encounter and for each problem.

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

Table 10.2 shows the proportion of problems for which at least one non-pharmacological treatment was given. Pharmacological and non-pharmacological treatments were sometimes given simultaneously to manage the presenting problem. However, for two-thirds (60.1%) of the problems that were managed with at least one non-pharmacological treatment, no pharmacological treatment was provided. At least one non-pharmacological treatment was used in the management of 30.5% of problems, and for 18.4% of problems at least one non-pharmacological treatment was provided without the addition of any medications.

One in five problems were managed with a clinical treatment, and for more than half of these (57.9%) no medications were given. GPs used a procedural treatment for the management of one in ten problems, and for two-thirds of these no medications were provided. The results presented in Table 10.2 also indicate that problems managed with a procedure were less likely to involve concomitant pharmacological treatment than those managed with a clinical treatment (65.3% compared with 57.9%).

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=144,674)	95% LCL	95% UCL
At least one non-pharmacological treatment	44,164	100.0	30.5	29.3	31.7
Without pharmacological treatment	26,551	60.1	18.4	17.7	19.0
At least one clinical treatment	32,050	100.0	22.2	21.0	23.3
Without pharmacological treatment	18,557	57.9	12.8	12.2	13.4
At least one procedural treatment	13,585	100.0	9.4	8.9	9.8
Without pharmacological treatment	8,789	64.7	6.1	5.7	6.4

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

10.2 Clinical treatments

The total number of clinical treatments provided by GPs was 36,211, at a rate of 36.6 per 100 encounters (Table 10.1).

Most frequent clinical treatments

The three most common clinical treatments were advice and education in general (13.3% of all non-pharmacological treatments), counselling for the problem being managed (9.1%) and advice and education pertaining to nutrition and weight (9.0%).

General advice/education was given at a rate of 6.8 per 100 encounters, counselling for the problem being managed at a rate of 4.7 per 100 encounters, and advice/education on nutrition and weight at a rate of 4.6 per 100 encounters. Advice/education about treatment (4.4 per 100 encounters) and medication (3.4 per 100 encounters) were also relatively common. Other common clinical treatments provided by GPs include advice and counselling on a range of other health areas, such as exercise, smoking and alcohol issues.

Table 10.3: Most frequent clinical treatments

Treatment	Number	Per cent of non-pharmacological treatments (n=50,775)	Rate per 100 encounters ^(a) (n=98,877)	95% LCL	95% UCL
Advice/education*	6,736	13.3	6.8	5.9	7.7
Counselling—problem*	4,603	9.1	4.7	3.8	5.5
Counselling/advice—nutrition/weight*	4,586	9.0	4.6	4.1	5.2
Advice/education—treatment*	4,304	8.5	4.4	3.7	5.0
Advice/education—medication*	3,340	6.6	3.4	3.0	3.8
Counselling—psychological*	2,840	5.6	2.9	2.6	3.1
Administrative procedure*	1,782	3.5	1.8	1.5	2.1
Counselling/advice—exercise*	1,471	2.9	1.5	1.1	1.9
Reassurance, support	1,462	2.9	1.5	1.0	1.9
Sickness certificate	997	2.0	1.0	0.6	1.4

(continued)

Table 10.3 (continued): Most frequent clinical treatments

Treatment	Number	Per cent of non-pharmacological treatments (n=50,775)	Rate per 100 encounters ^(a) (n=98,877)	95% LCL	95% UCL
Counselling/advice—smoking*	631	1.2	0.6	0.4	0.9
Counselling/advice—prevention*	372	0.7	0.4	0.0	0.8
Counselling/advice—alcohol*	368	0.7	0.4	0.2	0.5
Family planning*	359	0.7	0.4	0.2	0.6
Observe/wait*	295	0.6	0.3	0.0	0.7
Counselling/advice—lifestyle*	281	0.6	0.3	0.0	0.8
Counselling/advice—health/body*	274	0.5	0.3	0.0	0.7
Counselling/advice—pregnancy*	267	0.5	0.3	0.0	0.5
<i>Subtotal</i>	<i>34,969</i>	<i>68.9</i>	—	—	—
Total clinical treatments	36,211	71.3	36.6	34.5	38.8

(a) Figures do not total 100 as more than one treatment can be recorded at each encounter.

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

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

Problems managed with clinical treatments

A total of 32,050 problems included a clinical treatment as part of their management. The top ten problems accounted for almost 30% of all problems for which a clinical treatment was provided. The problem most often managed with a clinical treatment was depression (5.3% of problems managed with a clinical treatment), followed by URTI (5.0%), hypertension (3.9%) and diabetes (2.8%) (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 47.5% of depression contacts were managed with a clinical treatment, most likely counselling, and of these 44.5% were not given a prescription as part of the treatment. Likewise, 54.1% of gastroenteritis (presumed infectious) problems were managed with a clinical treatment, and 54.0% of these did not result in the provision of a medication. Asthma was less likely to be managed with a clinical treatment (20.4%) and less likely to be managed without medication when clinical treatment was given (29.3%). It is interesting to note that 26.8% of lipid disorders were managed with a clinical treatment and that 66.8% of these did not involve a medication.

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

Problem managed	Number	Per cent of problems with clinical treatment	Rate per 100 encounters ^{(a) (b)} (<i>n</i> =98,877)	95% LCL	95% UCL	Per cent this problem ^(c)	Per cent of treated problems—no meds ^(d)
Depression*	1,712	5.3	1.7	1.6	1.9	47.5	44.5
Acute upper respiratory infection	1,586	5.0	1.6	1.2	2.0	29.4	48.8
Hypertension*	1,252	3.9	1.3	1.0	1.5	13.8	48.8
Diabetes*	901	2.8	0.9	0.7	1.1	27.6	61.5
Lipid disorder	829	2.6	0.8	0.6	1.0	26.8	66.8
Anxiety*	770	2.4	0.8	0.6	1.0	45.5	64.0
Gastroenteritis, presumed infection	590	1.8	0.6	0.4	0.8	51.4	54.0
Viral disease, other/NOS	542	1.7	0.6	0.3	0.8	41.6	58.1
Back complaint*	540	1.7	0.6	0.4	0.7	20.5	50.7
Asthma	515	1.6	0.5	0.3	0.7	20.4	29.3
<i>Subtotal</i>	9,239	28.8	—	—	—	—	—
Total problems	32,050	100.0	32.4	30.7	34.2	—	—

(a) Figures do not total 100 as more than one treatment can be recorded at each encounter.

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

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

(d) The numerator is the number of cases of this problem that generated at least one clinical treatment but generated no medications. The denominator is the total number of contacts for this problem that generated at least one clinical treatment (with or without medications).

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

Note: LCL—lower confidence limit; UCL—upper confidence limit; meds—medications; NOS—not otherwise specified.

10.3 Procedural treatments

Procedural treatments included therapeutic actions and diagnostic procedures undertaken by the GP at the encounter. ICPC-2 codes were grouped across ICPC-2 chapters for this analysis because of small numbers within each chapter. There were 14,564 procedural treatments recorded, at a rate of 14.7 per 100 encounters (Table 10.1).

Most frequent procedures

Table 10.5 lists the most frequent procedural treatments. The most common procedure was the excision or removal of tissue (including destruction, debridement or cauterisation). It accounted for 6.1% of all non-pharmacological treatments and occurred at a rate of 3.1 per 100 encounters. This was followed by dressing/pressure/compression/tamponade, which occurred at a rate of 1.8 per 100 encounters, and accounted for 3.6% of all non-pharmacological treatments.

The most common diagnostic procedures undertaken were 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 as a pathology order on the survey form and are described in Chapter 12 – Investigations.

Table 10.5: Most frequent procedural treatments

Treatment	Number	Per cent of non-pharm treatments (n=50,775)	Rate per 100 encounters ^(a) (n=98,877)	95% LCL	95% UCL
Excision/removal tissue/biopsy/destruction/debridement/cauterisation*	3,109	6.1	3.1	2.6	3.7
Dressing/pressure/compression/tamponade*	1,823	3.6	1.8	1.6	2.1
Physical medicine/rehabilitation*	1,661	3.3	1.7	1.3	2.0
Local injection/infiltration*	1,612	3.2	1.6	1.3	1.9
Incision/drainage/flushing/aspiration/removal body fluid*	1,165	2.3	1.2	1.0	1.3
Other therapeutic procedures/surgery NEC*	1,119	2.2	1.1	0.6	1.7
Pap smear*	1,083	2.1	1.1	0.7	1.5
Repair/fixation—suture/cast/prosthetic device (apply/remove)*	802	1.6	0.8	0.7	1.0
Physical function test*	409	0.8	0.4	0.1	0.7
Electrical tracings*	320	0.6	0.3	0.1	0.6
Urine test*	312	0.6	0.3	0.0	0.6
Other preventive procedures/high-risk medication, condition*	309	0.6	0.3	0.0	0.7
Glucose test	276	0.5	0.3	0.0	0.6
<i>Subtotal</i>	<i>13,684</i>	<i>27.0</i>	—	—	—
Total procedural treatments	14,567	28.7	14.7	14.0	15.5

(a) Figures do not total 100 as more than one treatment can be described for each problem and only per cents >0.5% are included.

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

Note: non-pharm—non-pharmacological; LCL—lower confidence limit; UCL—upper confidence limit; NEC—not elsewhere classified.

Problems managed with a procedural treatment

A total of 13,586 problems involved a procedural treatment in their management. The top ten problems accounted for 37.1% of all problems for which a procedure was used (Table 10.6).

Solar keratosis/sunburn was the most common problem managed with a procedural treatment (6.8% of problems managed with a procedural treatment). Other problems frequently managed with a procedure were female genital check-ups (6.1%), excessive ear wax (3.8%) and malignant neoplasm of skin (3.6%).

Again, the two columns on the right side of the table show the proportion of contacts with each problem that was managed with a procedure and the proportion of problems being managed with a procedure without a concomitant medication. Excessive ear wax was the problem most likely to result in a procedure (75.6%), followed by lacerations (74.5%). Many of the problems that were managed with a procedure did not have a medication prescribed, advised or given. More than 70% of solar keratosis cases were managed with a procedure; however, 98.3% of these cases did not require any pharmacological treatment.

Table 10.6: The ten most common problems managed with a procedural treatment

Problem managed	Number	Per cent of problems with procedure	Rate per 100 encs ^{(a)(b)} (n=98,877)	95% LCL	95% UCL	Per cent of this problem ^(c)	Per cent of treated problems no meds ^(d)
Solar keratosis/sunburn	923	6.8	0.9	0.5	1.3	70.3	98.3
Female genital check-up*	824	6.1	0.8	0.5	1.2	46.8	97.9
Excessive ear wax	513	3.8	0.5	0.4	0.6	75.6	93.4
Malignant neoplasm skin	487	3.6	0.5	0.0	1.0	44.5	96.7
Laceration/cut	484	3.6	0.5	0.3	0.7	74.5	73.3
Warts	467	3.4	0.5	0.3	0.7	73.4	95.4
Back complaint*	376	2.8	0.4	0.0	0.7	14.3	56.1
Chronic ulcer skin (incl varicose ulcer)	370	2.7	0.4	0.1	0.6	65.8	75.9
Sprain/strain*	350	2.6	0.4	0.1	0.6	22.4	48.8
Asthma	240	1.8	0.2	0.0	0.6	9.5	18.6
<i>Subtotal</i>	<i>5,033</i>	<i>37.1</i>	—	—	—	—	—
Total problems	13,586	100.0	13.7	13.1	14.4	—	—

(a) Figures do not total 100 as more than one treatment can be recorded at each encounter.

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

(c) Percentage of contacts with this problem that generated at least one procedural treatment.

(d) The numerator is the number of cases of this problem that generated at least one procedural treatment but generated no medications. The denominator is the total number of contacts for this problem that generated at least one procedural treatment (with or without medications).

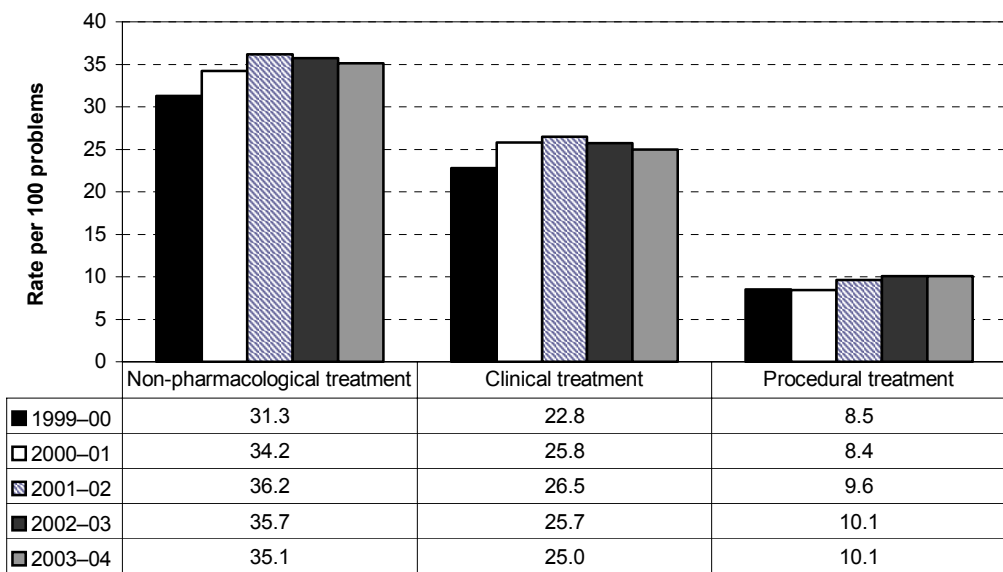
* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 3).

Note: encs—encounters; LCL—lower confidence limit; UCL—upper confidence limit; meds—medications; incl—including.

10.4 Changes from 1999–00 to 2003–04

Over the last five years, there has been a significant increase in the rates of provision of non-pharmacological treatments, from 46.0 per 100 encounters (95% CI: 44.1–47.8) in 1999–00 to 51.4 (95% CI: 48.9–53.8) in 2003–04. This was reflected in the rate of clinical treatments which increased from 33.5 per 100 encounters (95% CI: 31.8–35.2) to 36.6 per 100 (95% CI: 34.5–38.8) and of therapeutic procedures (12.5 per 100, 95% CI: 11.9–13.0, to 14.7 per 100, 95% CI: 14.0–15.5) (Appendix 5, Table A5.2).

Figure 10.1 shows the rates of non-pharmacological treatments per 100 problems managed for the last 5 years of the BEACH program, and demonstrates that the increase was not due to a rise in the number of problems managed.



Non-pharmacological managements

Figure 10.1: Changes in rates of non-pharmacological treatment

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 encounter, GPs could record up to two referrals. These included referrals to specialists, allied health professionals, hospitals for admission, emergency departments or other medical services. Referrals to hospital outpatient clinics and other GPs were classified as referrals to other medical services.

11.1 Number of referrals and admissions

The patient was given at least one referral at 11.0% of all encounters, and for 7.5% of all problems managed. More than one referral could be recorded at an encounter. As a result, there were 11,495 referrals made at a rate of 11.6 per 100 encounters. The most frequent were referrals to specialists (7.9 per 100 encounters), followed by referrals to allied health services (2.6 per 100). Very few patients were referred to hospital for admission (0.6 per 100 encounters), or to the hospital emergency department (0.2 per 100) or other medical services (0.1 per 100). Referrals to specialists were given at a higher rate per 100 problems managed (5.4), compared with referrals to allied health professionals (1.8 per 100 problems) (Table 11.1).

Table 11.1: Summary of referrals and admissions

	Number	Rate per 100 encounters (<i>n</i> =98,877)	95% LCL	95% UCL	Rate per 100 problems (<i>n</i> =144,674)	95% LCL	95% UCL
At least one referral	10,892	11.0	10.5	11.5	7.5	7.2	7.8
Referrals	11,495	11.6	11.1	12.1	8.0	7.6	8.3
Specialist	7,775	7.9	7.5	8.2	5.4	5.1	5.6
Allied health service	2,600	2.6	2.4	2.9	1.8	1.6	2.0
Hospital	544	0.6	0.3	0.8	0.4	0.2	0.5
Emergency department	156	0.2	0.0	0.5	0.1	0.0	0.3
Other medical services	138	0.1	0.0	0.6	0.1	0.0	0.4
Other referrals	280	0.3	0.0	0.6	0.2	0.0	0.4

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

11.2 Most frequent referrals

Of the 11,495 referrals, 91.5% (*n*=10,513) were referrals to specialists, allied health services or other medical services. Referrals to the ten most common specialists accounted for 71.1% of all referrals to medical specialists, and the top ten allied health professionals accounted for 78.1% of all allied health referrals (Table 11.2).

The most frequent referrals made to specialists were to surgeons (10.6% of referrals to medical specialists), ophthalmologists (10.3%), orthopaedic surgeons (9.1%) and dermatologists (8.2%).

Approximately 40% of referrals to allied health services were to physiotherapists, and these accounted for 9.7% of all referrals to specialists, allied health services and other medical services. These were followed by referrals to psychologists (7.1% of all referrals to allied health professionals), dietitians or nutritionists (6.9%), dentists (6.3%) and podiatrists or chiropodists (5.9%) (Table 11.2).

Referrals to other medical services include referrals to other GPs and to hospital outpatient departments. Referrals to other medical services were relatively rare (1.3% of all referrals).

Table 11.2: The most frequent referrals to specialists, and allied health and other medical services

Professional to whom patient referred	Number	Per cent of referrals ^(a)	Per cent of referral group	Rate per 100 encounters (n=98,877)	95% LCL	95% UCL
Medical specialist	7,775	74.0	100.0	7.9	7.5	8.2
Referral; surgeon	821	7.8	10.6	0.8	0.7	1.0
Referral; ophthalmologist	797	7.6	10.3	0.8	0.7	0.9
Referral; orthopaedic surgeon	709	6.7	9.1	0.7	0.6	0.8
Referral; dermatologist	636	6.1	8.2	0.6	0.5	0.8
Referral; gynaecologist	546	5.2	7.0	0.6	0.4	0.7
Referral; ear, nose and throat	528	5.0	6.8	0.5	0.4	0.7
Referral; cardiologist	504	4.8	6.5	0.5	0.3	0.7
Referral; gastroenterologist	418	4.0	5.4	0.4	0.2	0.6
Referral; urologist	311	3.0	4.0	0.3	0.1	0.5
Referral; psychiatrist	259	2.5	3.3	0.3	0.1	0.5
<i>Subtotal: top ten specialist referrals</i>	<i>5,529</i>	<i>52.6</i>	<i>71.1</i>	—	—	—
Allied health and other professionals	2,600	24.7	100.0	2.6	2.4	2.9
Referral; physiotherapy	1,024	9.7	39.4	1.0	0.9	1.2
Referral; psychologist	185	1.8	7.1	0.2	0.0	0.5
Referral; dietitian/nutrition	178	1.7	6.9	0.2	0.0	0.5
Referral; dentist	163	1.6	6.3	0.2	0.0	0.4
Referral; podiatrist/chiropodist	153	0.5	5.9	0.2	0.0	0.4
Referral; acoustic testing	77	0.7	3.0	0.1	0.0	0.5
Referral; drug and alcohol	72	0.7	2.8	0.1	0.0	0.5
Referral; optometrist	60	0.6	2.3	0.1	0.0	0.4
Referral; counsellor	59	0.6	2.3	0.1	0.0	0.4
Referral; mental health team	59	0.6	2.3	0.1	0.0	0.4
<i>Subtotal: top ten allied health referrals</i>	<i>2,029</i>	<i>19.3</i>	<i>78.1</i>	—	—	—
Other medical services	138	1.3	100.0	0.1	0.0	0.6
Total specialist, allied health & other medical service referrals	10,513	100.0	—	10.6	10.1	11.1

(a) Percentage of referrals refers to the proportion of the combined number of specialist, allied health professional and other medical service referrals.

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

11.3 Problems that were referred

A referral to a specialist was provided as part of the management of 7,947 problems. The ten problems most commonly associated with a referral to a specialist accounted for 17.7% of all problems referred to a specialist. The problems most often referred were malignant neoplasms of the skin (accounting for 2.6% of problems referred to a specialist), diabetes (2.4%), pregnancy (2.4%) and back complaints (1.7%) (Table 11.3).

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=98,877)	95% LCL	95% UCL
Malignant skin neoplasm	208	2.6	0.2	0.0	0.4
Diabetes*	190	2.4	0.2	0.0	0.4
Pregnancy*	189	2.4	0.2	0.0	0.4
Back complaint*	137	1.7	0.1	0.0	0.4
Ischaemic heart disease*	137	1.7	0.1	0.0	0.4
Depression*	133	1.7	0.1	0.0	0.4
Osteoarthritis*	124	1.6	0.1	0.0	0.4
Hypertension*	105	1.3	0.1	0.0	0.4
Abnormal test results*	93	1.2	0.1	0.0	0.4
Solar keratosis/sunburn	92	1.2	0.1	0.0	0.4
<i>Subtotal: top ten problems referred to a specialist</i>	<i>1,408</i>	<i>17.7</i>	—	—	—
Total problems referred to specialist	7,947	100.0	8.0	7.7	8.4

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

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

Referrals to allied health services were fewer in number ($n=2,600$, Table 11.2) than medical specialist referrals, possibly because formal referrals to such services are not always required. There were 2,684 problems referred to an allied health professional or service. Table 11.4 shows the ten most common of these. They accounted for 42.4% of all problems referred to allied health services.

The problems most frequently referred to allied health professionals were back complaints (8.4% of problems referred) and sprains and strains (6.4%). These two problems are likely to be referred to physiotherapists. Depression (5.6%), diabetes (5.2%) and teeth/gum disease (4.0%) were also frequently referred to allied health services. Note that diabetes, back complaints and depression were referred relatively frequently to both allied health services and medical specialists.

There were 544 referrals for hospital admission (Table 11.1). The ten problems most commonly associated with hospital admission referrals are shown in Table 11.5. Although the numbers involved are very small, it is interesting to note the types of problems for which hospital admission was sought. These included ischaemic heart disease (4.7% of problems referred for admission), pneumonia (4.1%) and fracture (3.5%).

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=98,877)	95% LCL	95% UCL
Back complaint*	225	8.4	0.2	0.0	0.4
Sprain/strain*	171	6.4	0.2	0.0	0.4
Depression*	150	5.6	0.2	0.0	0.4
Diabetes*	140	5.2	0.1	0.0	0.4
Teeth/gum disease	107	4.0	0.1	0.0	0.4
Osteoarthritis*	102	3.8	0.1	0.0	0.4
Anxiety*	70	2.6	0.1	0.0	0.4
Musculoskeletal injury NOS	65	2.4	0.1	0.0	0.5
Bursitis/tendonitis/synovitis NOS	57	2.1	0.1	0.0	0.4
Obesity (BMI>30)	53	2.0	0.1	0.0	0.7
<i>Subtotal: top ten problems referred to AHS</i>	<i>1,139</i>	<i>42.4</i>	—	—	—
Total problems referred to AHS	2,684	100.0	2.7	2.4	3.0

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

Note: LCL—lower confidence limit; UCL—upper confidence limit; NOS—not otherwise specified; BMI—body mass index; AHS—allied health service.

Table 11.5: The ten problems most frequently referred to hospital

Problem managed	Number	Per cent of problems referred	Rate per 100 encounters (n=98,877)	95% LCL	95% UCL
Ischaemic heart disease*	27	4.7	0.03	0.0	0.5
Pneumonia	24	4.1	0.02	0.0	0.5
Fracture*	20	3.5	0.02	0.0	0.5
Pregnancy*	20	3.4	0.02	0.0	0.6
Appendicitis	16	2.8	0.02	0.0	0.6
Heart failure	15	2.7	0.02	0.0	0.6
Chest pain, NOS	14	2.4	0.01	0.0	0.7
Acute bronchitis/bronchiolitis	12	2.1	0.01	0.0	0.7
Chronic obstructive pulmonary disease	11	2.0	0.01	0.0	0.6
Skin infection, other	10	1.7	0.01	0.0	0.7
<i>Subtotal: top ten problems referred for admission</i>	<i>169</i>	<i>29.5</i>	—	—	—
Total problems referred to hospital	572	100.0	0.6	0.3	0.8

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

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

11.4 Changes from 1999–00 to 2003–04

There were no significant changes across the five years (1999–00 to 2003–04) of BEACH data in the rates of referral and the types of referral (Appendix 5, Table A5.2).

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, full blood count). 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 (79.2%) of encounters. At least one pathology test order was recorded at 15.5% of encounters (for 11.9% of problems managed) and at least one imaging test was ordered at 7.2% of encounters (for 5.1% of problems managed) (Table 12.1).

Table 12.1: Number of encounters and problems at which a pathology or imaging test was ordered

	Number of encs	Per cent of encs (n=98,877)	95% LCL	95% UCL	Number of problems	Per cent of problems (n=144,674)	95% LCL	95% UCL
Pathology and imaging ordered	1,840	1.9	1.7	2.1	1,380	1.0	0.8	1.1
Pathology only ordered	13,486	13.6	13.2	14.1	15,897	11.0	10.6	11.4
Imaging only ordered	5,244	5.3	5.1	5.5	5,952	4.1	3.9	4.3
No tests ordered	78,307	79.2	78.5	79.9	121,445	83.9	83.4	84.4
At least one pathology ordered	15,326	15.5	14.9	16.1	17,277	11.9	11.5	12.4
At least one imaging ordered	7,083	7.2	6.9	7.5	7,332	5.1	4.8	5.3

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

12.1 Pathology ordering

A comprehensive report on pathology ordering by GPs in Australia in 1998, written by the General Practice 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 2000.³⁵ 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 34,831 pathology tests (or battery of tests) ordered at a rate of 35.2 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 3. The main pathology groups reflect those used in previous analyses of pathology tests recorded by the HIC.³⁶

The top four pathology test groups were Chemistry, Haematology, Microbiology and Cytology, which together accounted for more than 90% of pathology test orders. The fifth largest group was Other NEC (other pathology test orders that could not be classified elsewhere), which made up 2.3% of pathology test orders. The size of this group was in part due to non-specificity of recording of some pathology orders by some GPs (e.g. blood test).

The largest of the groups, Chemistry, accounted for 54.2% of all tests and was recorded at a rate of 19.1 per 100 encounters. Within this group the most frequently ordered test was lipids (17.9%) followed by urea and creatinine (EUC, 12.8%). Full blood count (68.9%) was the largest group within Haematology and urine, microscopy, culture and sensitivity (urine MC&S) (32.7%) was the largest in Microbiology.

The most frequently ordered test types were full blood count; lipids; EUC; liver function; electrolytes, glucose; thyroid function; urine MC&S and Pap smear tests. Full blood counts accounted for 13.3% of tests and were ordered at a rate of 4.7 per 100 encounters. Pap smears accounted for 4.9% of all tests and made up the greater proportion of the Cytology group (98.1%). Lipid tests were ordered at a rate of 3.4 per 100 encounters (Table 12.2).

Table 12.2: Distribution of pathology orders across MBS 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=98,877)	95% LCL	95% UCL
Chemistry	18,881	54.2	100	19.1	18.1	20.1
Lipids	3,384	9.7	17.9	3.4	3.2	3.7
EUC	2,418	6.9	12.8	2.5	2.1	2.8
Liver function	2,193	6.3	11.6	2.2	2.0	2.5
Glucose/tolerance	2,051	5.9	10.9	2.1	1.9	2.3
Thyroid function	1,905	5.5	10.1	1.9	1.7	2.1
Multibiochemical analysis	1,457	4.2	7.7	1.5	0.8	2.1
HbA1c	913	2.6	4.8	0.9	0.7	1.1
Chemistry; other	860	2.5	4.6	0.9	0.6	1.2
Ferritin	815	2.3	4.3	0.8	0.7	1.0
Hormone assay	814	2.3	4.3	0.8	0.4	1.3
Haematology	6,699	19.2	100	6.8	6.4	7.2
Full blood count	4,614	13.3	68.9	4.7	4.4	4.9
Erythrocyte sedimentation rate	998	2.9	14.9	1.0	0.8	1.2
Coagulation	775	2.2	11.6	0.8	0.6	1.0
Microbiology	5,217	15.0	100	5.3	4.9	5.7
Urine MC&S	1,708	4.9	32.7	1.7	1.6	1.9
Microbiology; other	624	1.8	12.0	0.6	0.5	0.8
Hepatitis serology	588	1.7	11.3	0.6	0.2	1.0
Faeces MC&S	317	0.9	6.1	0.3	0.1	0.5

(continued)

Table 12.2 (continued): Distribution of pathology orders across MBS 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=98,877)	95% LCL	95% UCL
Microbiology (continued)						
HIV	302	0.9	5.8	0.3	0.0	0.6
Chlamydia	294	0.8	5.6	0.3	0.1	0.5
Vaginal swab and C&S	256	0.7	4.9	0.3	0.0	0.5
Cytology	1,736	5.0	100	1.8	1.4	2.1
Pap smear	1,703	4.9	98.1	1.7	1.4	2.1
Other NEC	799	2.3	100	0.8	0.5	1.1
Blood test	335	1.0	42.0	0.3	0.0	1.3
Other test NEC	289	0.8	36.2	0.3	0.0	0.6
Infertility/pregnancy	240	0.7	100	0.2	0.0	0.5
Tissue pathology	685	2.0	100	1.8	1.4	2.1
Histology, skin	625	1.8	91.2	0.6	0.1	1.2
Immunology	474	1.4	100	0.7	0.2	1.2
Anti-nuclear antibodies	130	0.4	27.5	0.1	0.0	0.4
Simple basic tests	100	0.3	100	0.1	0.0	0.4
Total pathology tests	34,831	100	—	35.2	33.7	36.7

Note: Encs—encounters; LCL—lower confidence limit; UCL—upper confidence limit; NEC—not elsewhere classified.

Problems for which pathology tests were ordered

Table 12.3 describes, in decreasing order of frequency, the most common problems under management for which pathology was ordered. There were 17,277 problems to which pathology tests were linked (Table 12.1), the average number of pathology tests being 2.02 per tested problem. The five problems accounting for the highest number of pathology tests ordered were diabetes (6.6% of problem–pathology combinations), hypertension (6.1%), lipid disorder (5.2%), general check-up (3.9%), female genital check-up (including Pap smear) (3.9%) and weakness/tiredness (3.5%). 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 contrasts. The second-last column shows the percentage 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 9,099 hypertension problems recorded in the data set (6.3% of problems). Diabetes (2.2% of problems) was managed far less frequently but accounted for more pathology tests than hypertension. There were 2,359 test orders (6.6%) associated with diabetes and 2,178 test orders (6.1%) associated with hypertension. This is because 28.6% of diabetes contacts resulted in a pathology test compared with only 9.7% of contacts with hypertension.

Weakness/tiredness was not a problem label that ranked in the top 30 problems managed in general practice, yet it ranked sixth highest in the problems associated with pathology ordering. This is because the decision to order a pathology test for weakness/tiredness was relatively frequent (58.0% of contacts generating an order) and where such a decision was made, multiple pathology tests were likely (averaging 346.7 test orders per 100 problems).

The problem label of female genital check-up, 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 ^(a)	Per cent of problems with test ^(b)	Rate of path orders per 100 problems with pathology ^(c)
Diabetes*	3,264	2,359	6.6	28.6	253.1
Hypertension*	9,099	2,178	6.1	9.7	246.0
Lipid disorders*	3,093	1,875	5.2	29.7	203.9
Female genital check-up*	1,759	1,396	3.9	68.2	116.4
General check-up*	1,806	1,256	3.5	23.4	296.8
Weakness/tiredness general	620	1,246	3.5	58.0	346.7
Urinary tract infection*	1,650	996	2.8	52.2	115.7
Abnormal test results*	810	608	1.7	46.4	161.8
Blood test NOS	225	574	1.6	78.5	324.9
Anaemia*	705	570	1.6	34.6	233.8
<i>Subtotal</i>	<i>23,031</i>	<i>13,058</i>	<i>36.0</i>	<i>—</i>	<i>—</i>
Total	144,674	35,793	100.0	11.9	201.6

(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 34,831 pathology test orders and 35,793 problem–pathology combinations.

(b) The percentage of total contacts with the problem that 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; NOS—not otherwise specified.

12.2 Imaging ordering

A comprehensive report on imaging orders by GPs in Australia in 1999–00, written by the General Practice Statistics and Classification Unit using BEACH data, was published by the AIHW in 2001.³⁷ 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.

Nature of imaging orders at encounter

There were 8,121 orders for imaging and these were made at a rate of 8.2 per 100 encounters. At least one imaging test was ordered at 7.2% of encounters and for 5.1% of problems managed. The imaging tests recorded were grouped into one of five categories – Diagnostic radiology, Ultrasound, Computerised tomography (CT), Nuclear medicine imaging and Magnetic resonance imaging (MRI) (Appendix 3). Diagnostic radiology made up more than half (55.8%) of all imaging tests, while ultrasound accounted for 32.4%, CT scanning 10.0%, Nuclear medicine 1.3% and MRI 0.5% (Table 12.4).

Table 12.4: The most frequent imaging tests ordered, by MBS group and most frequent tests

Imaging test ordered	Number	Per cent of tests	Per cent of group	Rate per 100 encounters (n=98,877)	95% LCL	95% UCL
Diagnostic radiology	4,533	55.8	100.0	4.6	4.3	4.8
X-ray; chest	1,050	12.9	23.2	1.1	0.9	1.2
X-ray; knee	416	5.1	9.2	0.4	0.3	0.6
Mammography; female	351	4.3	7.8	0.4	0.0	0.7
X-ray; hip	206	2.5	4.5	0.2	0.0	0.4
X-ray; foot/feet	200	2.5	4.4	0.2	0.0	0.4
X-ray; ankle	198	2.4	4.4	0.2	0.0	0.4
X-ray; spine; lumbosacral	187	2.3	4.1	0.2	0.0	0.4
X-ray; shoulder	170	2.1	3.8	0.2	0.0	0.4
X-ray; wrist	162	2.0	3.6	0.2	0.0	0.4
Test; densitometry	144	1.8	3.2	0.2	0.0	0.4
X-ray; finger(s)/thumb	131	1.6	2.9	0.1	0.0	0.3
X-ray; hand	126	1.6	2.8	0.1	0.0	0.3
X-ray; spine; cervical	104	1.3	2.3	0.1	0.0	0.4
X-ray; spine; lumbar	89	1.1	2.0	0.1	0.0	0.4
X-ray; abdomen	87	1.1	1.9	0.1	0.0	0.4
Ultrasound	2,631	32.4	100.0	2.7	2.5	2.8
Ultrasound; pelvis	469	5.8	17.8	0.5	0.3	0.6
Ultrasound; abdomen	284	3.5	10.8	0.3	0.1	0.5
Ultrasound; breast; female	274	3.4	10.4	0.3	0.0	0.7
Ultrasound; obstetric	207	2.6	7.9	0.2	0.0	0.5
Ultrasound; shoulder	200	2.5	7.6	0.2	0.0	0.4
Ultrasound; renal tract	121	1.5	4.6	0.1	0.0	0.3
Ultrasound; abdomen upper	103	1.3	3.9	0.1	0.0	0.4
Test; doppler	101	1.2	3.8	0.1	0.0	0.4
Echocardiography	98	1.2	3.7	0.1	0.0	0.4
Ultrasound; leg	82	1.0	3.1	0.1	0.0	0.4
Computerised tomography	813	10.0	100.0	0.8	0.7	0.9
CT scan; brain	148	1.8	18.2	0.2	0.0	0.4
CT scan; abdomen	104	1.3	12.8	0.1	0.0	0.4
CT scan; head	88	1.1	10.8	0.1	0.0	0.4
CT scan; spine; lumbar	84	1.0	10.3	0.1	0.0	0.4
Nuclear medicine imaging	106	1.3	100.0	0.1	0.0	0.3
Scan; bone(s)	85	1.0	80.1	0.1	0.0	0.4
Magnetic resonance imaging	38	0.5	100.0	0.0	0.0	0.5
Total imaging tests	8,121	100	—	8.2	7.8	8.6

Note: LCL—lower confidence limit; UCL—upper confidence limit; CT—computerised tomography.

Chest x-rays were by far the most common subgroup in Diagnostic radiology (23.2%), followed by x-ray of the knee (9.2%) and mammography (7.8%). Ultrasound was commonly of the pelvis (17.8%), abdomen (10.8%), breast (10.4%), obstetric (7.9%) and shoulder (7.6%). CT scans were most commonly performed on the brain (18.2%), abdomen (12.8%) and head (10.8%). Most of the nuclear medicine tests involved bone scans (80.1%).

Overall, the most frequently ordered imaging test was chest x-ray, which accounted for 12.9% of all imaging and was ordered at a rate of 1.1 per 100 encounters. Pelvic ultrasound, the second most frequently ordered, accounted for 5.8% of all imaging tests and was ordered at a rate of 0.5 per 100 encounters (Table 12.4).

Problems for which imaging was ordered

Table 12.5 describes the problems for which an imaging test was most frequently ordered. They are presented in decreasing order of test frequency. There were 8,196 problem–imaging combinations. Five (including the top four) of the ten most common problems were related to the musculoskeletal system. The remaining problems were related to abdominal, female genital, breast, skin and chest problems.

Back complaint, the most common problem for which imaging was ordered, accounted for 5.0% of all imaging, and 13.6% of contacts with a back complaint resulted in an imaging order. Although fracture accounted for slightly fewer imaging orders (4.8%), 36.9% of contacts with this problem resulted in an order for imaging.

The ordering of multiple imaging for a single problem was far 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, 149.9 tests being ordered for every 100 problem contacts.

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)
Back complaint*	2,637	413	5.0	13.6	115.2
Fracture*	984	393	4.8	36.9	108.2
Osteoarthritis*	2,748	374	4.6	12.2	111.6
Sprain/Strain*	1,564	328	4.0	18.4	114.1
Abdominal pain*	613	223	2.7	32.3	112.6
Injury musculoskeletal NOS	761	207	2.5	23.5	115.6
Female genital check-up*	1,759	192	2.3	9.0	121.4
Breast lump/mass (female)	190	172	2.1	60.1	149.9
Injury skin, other	653	165	2.0	21.9	115.3
Acute bronchitis/bronchiolitis	2,396	131	1.6	5.4	102.1
<i>Subtotal</i>	<i>14,306</i>	<i>2,599</i>	<i>31.7</i>	<i>—</i>	<i>—</i>
Total	144,674	8,196	100.0	5.1	110.8

(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 8,121 imaging test orders and 8,196 problem–imaging combinations.

(b) The percentage of total contacts with the problem that 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.

12.3 Changes from 1999–00 to 2003–04

Changes in pathology

Differences in the collection and coding of pathology data from the first two years of BEACH data (1998–99 and 1999–00) mean that these data are not comparable with data from 2000–01 onward. Over the most recent four years there has been a significant increase in the number of pathology tests ordered per 100 encounters, from 29.7 per 100 encounters (95% CI: 28.4–30.9) in 2000–01 to 35.2 per 100 (95% CI: 33.7–36.7) in 2003–04. This represents a linear increase of almost 20% over the last four years of the BEACH program. Two-thirds of this increase in pathology ordering was accounted for by an increase in chemical pathology from 15.7 per 100 encounters (95% CI: 14.8–16.5) in 2000–01 to 19.1 per 100 (95% CI: 18.1–20.1) in 2003–04 (Appendix 5, Table A5.16).

The change in pathology ordering over the first three years of the BEACH program was investigated in detail in a specific study of pathology ordering patterns undertaken for the Australian Government Department of Health and Ageing. The results have been reported in a separate publication.³⁸ Since the beginning of the third year of BEACH, a change in coding of pathology orders allowed more specificity in recording these orders.

Changes in imaging

Following an increase in the imaging order rate over the period 1999–00 to 2002–03, from 7.4 to 8.6 tests per 100 encounters, the rate steadied in 2003–04 (8.2 per 100 encounters) (Appendix 5, Table A5.17).

13 Selected topics—changes over time

This chapter uses multiple linear regression to examine in more detail any changes in management rates of particular problems and medications of interest.

Topic selection was based on:

- medications or problems of topical interest in terms of public health initiatives or developments in treatments. In particular topics were examined that are associated with the National Health Priority Areas⁶
- whether there were significant changes in overall rates of management of a problem, in overall rates of a medication or non-pharmacological treatments.

Based on these criteria, five topics were selected for examination of management over time:

- the use of non-steroidal anti-inflammatory drugs (NSAIDs) to manage all arthritis (including osteoarthritis and rheumatoid arthritis) versus other musculoskeletal problems
- the use of anti-depressants in the management of depression and other psychological problems
- management rates of non-gestational diabetes
- the use of statins in the management of lipid disorders
- the use of inhalant medications (preventives and bronchodilators) in the management of asthma.

13.1 Method

Medications included in trends analysis

All medications prescribed or supplied by the GP (referred to as 'medication rates' in this section), are included in the trends analyses in the following section. For most medications those advised for over-the-counter purchase (OTC) were not included in this analysis. The exception was asthma inhalants where OTC medications were included to obtain an accurate estimation of the use of bronchodilators for asthma. Chapter 9 reports medication rates separately for each of the prescribed medications, advised OTC medications and medications supplied by the GP. Therefore there may be differences in the trends over time between the medication rates reported here and the prescribing rates in Chapter 9.

Statistical analysis

Trends over time were analysed using SAS V8.2 regression procedures that adjust the standard error to allow for the design effect of the cluster sample.¹² Test statistics and p-values based on the adjusted standard error are more conservative than those that are

calculated without taking into account the design effect of the cluster sample and provide a more stringent test of significant changes over time.

Changes in the annual rates per 100 encounters were analysed both alone and after controlling for patient age and sex.

Linear regression was performed for changes over time in medications prescribed/supplied for specific problems of interest to detect:

- whether there has been a change over time in the medication management for the problem of interest (e.g. Has there been an increase over the last six years in the medication rate of 'statins' for lipid disorders?) or
- whether any observed change in medication rate is explained by a commensurate change in rates of management of the problems for which this medication is prescribed. For example, has there been any change in medication rate for a specific problem or is the observed change in medication rate due to the change in management rates of the selected problem?

Regression was performed for the medication while holding type of problem constant, for example by performing linear regression for anti-depressant medications over time for depression problems. Patient age and sex were included to control for any changes in patient age and sex distribution across sample years.

All analyses were weighted for the GP's age, sex and activity level.

13.2 Non-steroidal anti-inflammatory drugs and the management of arthritis and other musculoskeletal problems

NSAIDs were defined as the medications included in the Anatomical Therapeutic Chemical (ATC) classification index code M01A.¹⁹ For analysis, the NSAIDs were further subdivided into coxibs (ATC subgroup M01A H)¹⁹ and all other NSAIDs. Only those NSAIDs that were prescribed or supplied by the GP were included in the analysis to exclude OTC NSAIDs that may be used as general analgesics.

Musculoskeletal problems (ICPC chapter 'L') were divided into all arthritis problems (rheumatoid arthritis, osteoarthritis and unspecified arthritis) versus all other musculoskeletal problems. These broad problem categories were derived from the recommended indications for the use of coxibs³⁹ and the problems for which NSAIDs were most often prescribed. The medication rate of NSAIDs for arthritis problems was compared with the medication rate for other musculoskeletal problems. Multiple regression was used to examine trends over time in the medication rate of NSAIDs for arthritis, other musculoskeletal problems and non-musculoskeletal problems.

Arthritis problems were managed at a rate of 4.0 per 100 encounters in 2003–04. An extrapolation based on 90 million general practice items claimed through Medicare in 2003–04 estimates that there were approximately 3.6 million encounters that year in Australia in which GPs managed arthritis.

In 2003–04 NSAIDs were prescribed or supplied by the GP at a rate of 5.2 per 100 encounters and coxibs were prescribed or supplied at 2.3 per 100 encounters. These rates extrapolate to an estimated 4.6 million occasions where GPs prescribed or supplied a NSAID, of which 2.1 million were coxibs.

Current status of Cox-2 inhibitors (coxibs)

Figure 13.1 is a flow chart describing the patients and problems for which coxibs were prescribed or supplied directly by the GP to the patient.

Rate of prescription or supply

There were 2,225 occasions on which coxibs were prescribed or supplied, accounting for 2.2% of all medications prescribed, supplied or advised. They were given at a rate of 1.5 per 100 total problems. Rofecoxib was slightly more common than celecoxib, accounting for 51.1% of all the coxibs. The median prescribed daily dose for rofecoxib was 25 mg and for celecoxib 200 mg.

Patients

The sex distribution of the patients was similar to that of the total sample, but females were slightly more likely to receive these medications (2.3 per 100 encounters) than males (2.1 per 100). Patients over the age of 44 years accounted for more than 80% of those receiving a coxib, half of these being aged 45–64 years and half being older people. Those aged between 65 and 74 years were the most likely to receive this medication (4.1 medications per 100 contacts with patients in this age group), followed by those of 45–64 years and those aged 75 years or more (3.3 per 100 encounters in both cases).

Reasons for encounter: The most common patient reason for encounter was a request for a prescription (described at a rate of 29.0 per 100 coxib encounters) followed by back complaints (16.9 per 100) and knee complaints (10.0 per 100).

Problems managed

Osteoarthritis was the most common problem managed with coxibs, accounting for more than one-third of the coxib medications (37.3 per 100 coxib encounters). Back complaint was the second most frequent problem treated with coxibs (10.3 per 100 coxib encounters), followed by arthritis (not otherwise specified) and then by a range of other musculoskeletal problems.

Other management

Medication: A total of 755 other medications were prescribed, supplied or recommended at the same encounter, for the same problem for which the coxibs were used. Simple analgesics were the most common co-medications (7.5 per 100 of these problems), followed by compound and narcotic analgesics (5.2 and 4.0 per 100 respectively).

Non-pharmacological: Other treatments were utilised less often for these problems than in the total data set (22.8 per 100 problems managed with coxibs, compared with 35.1 per 100 total problems). Physical medicine/rehabilitation was the most common, at 5.4 per 100 coxib problems. Various types of advice and education made up the majority of the rest of these treatments.

Referrals and investigations: The patient was referred to other health professionals (specialists, allied health and hospital services) for these problems at a rate of 9.9 per 100 problems

managed, most commonly for physiotherapy (4.6 per 100). Pathology was ordered at a rate of 13.4 per 100 problems managed with coxibs, and, as would be expected considering the types of problems being managed, imaging was ordered at the high rate of 13.8 per 100 of these problems compared with a rate of 5.6 in the total sample.

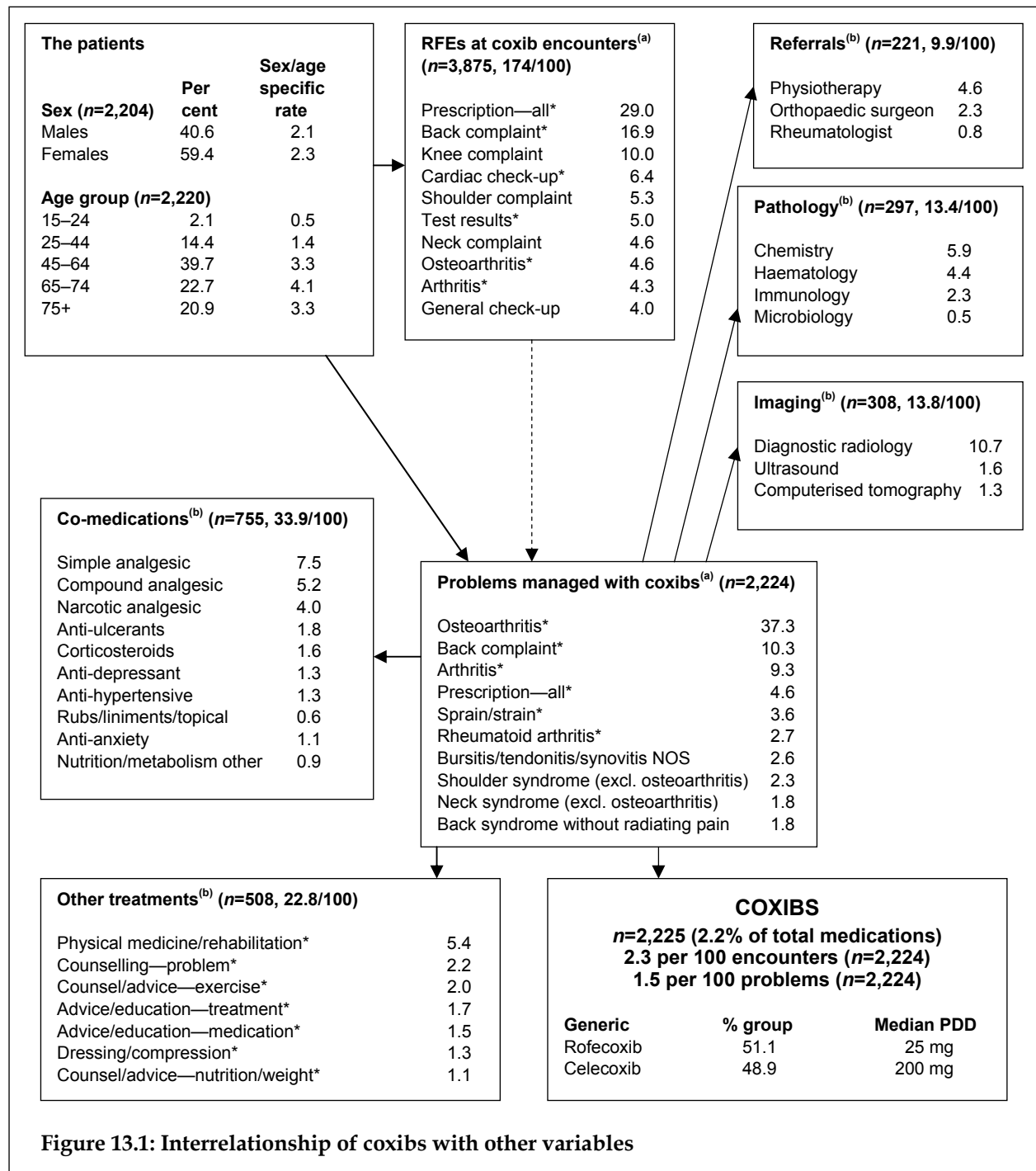


Figure 13.1: Interrelationship of coxibs with other variables

(a) Expressed as rates per 100 encounters at which coxibs were used (n=2,224).

(b) Expressed as rates per 100 problems for which coxibs were used (n=2,224).

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

Note: RFE—reasons for encounter, PDD—prescribed daily dose, NOS—not otherwise specified; excl.—excluding.

Changes over time

Figure 13.2 shows the unadjusted management rates of arthritis and other musculoskeletal problems over the six years of data collection. While there was a significant increase in the unadjusted management rates of arthritis over time ($p=0.0006$), after adjustment for patient age and sex this increase was not significant ($p=0.34$). There was no change in the management rate of other musculoskeletal problems over the six years.

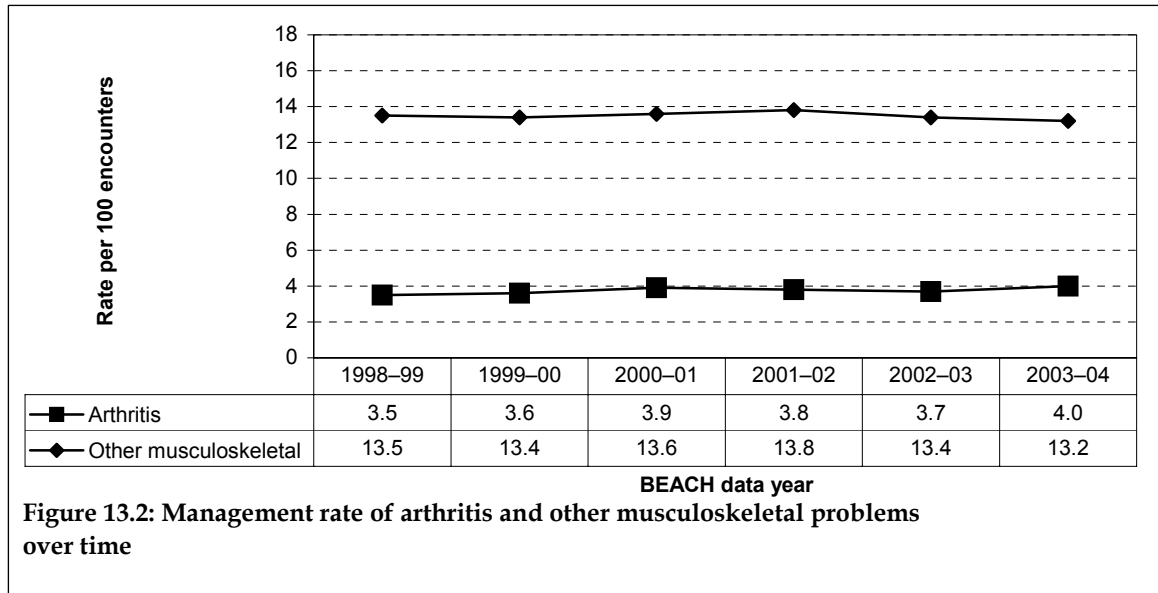
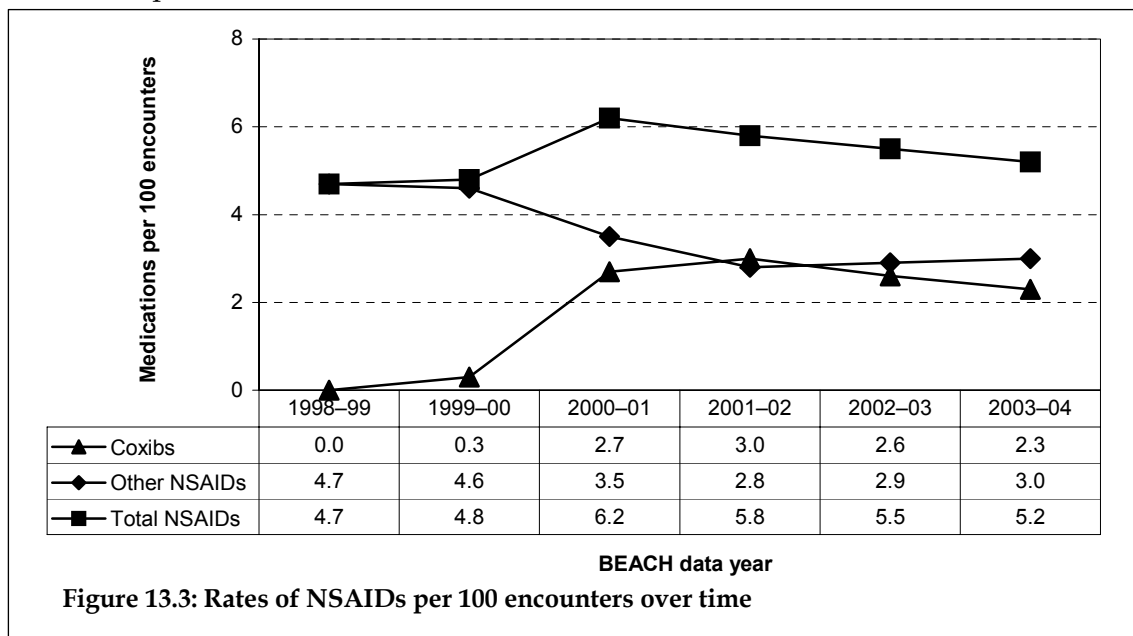
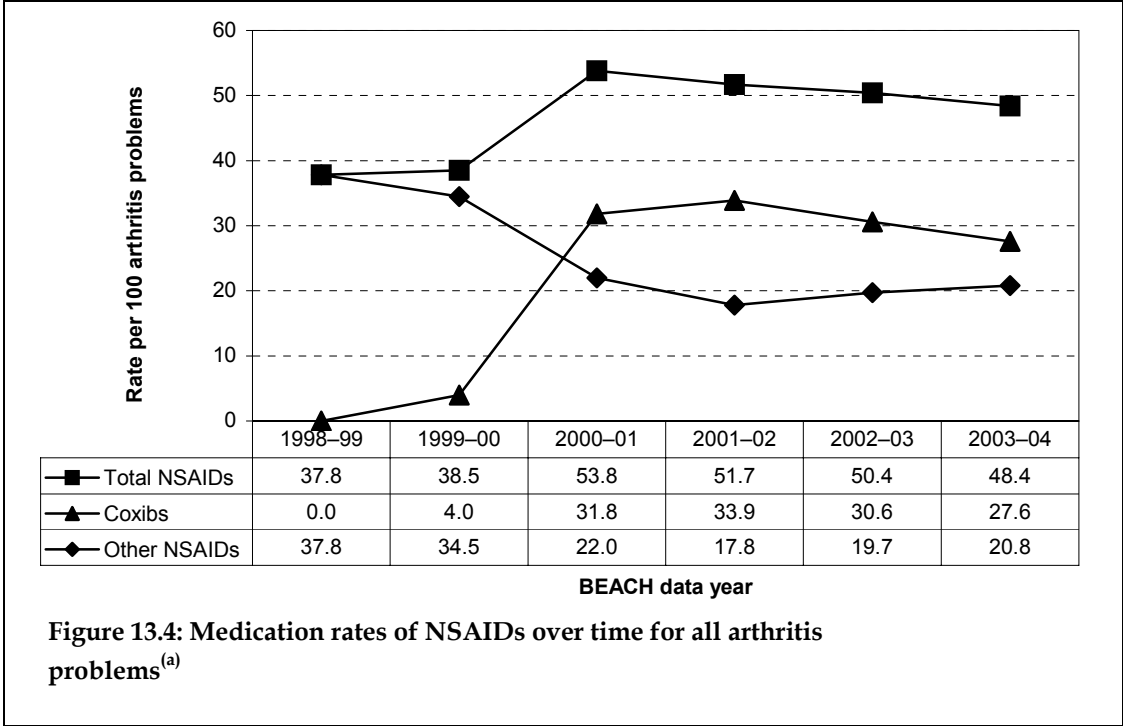


Figure 13.3 shows the medication rate of NSAIDs per 100 encounters unadjusted for problem under management. There was a marked increase in the prescription/supply rates of total NSAIDs from 4.8 per 100 encounters in 1999-00 to 6.2 per 100 encounters in 2000-01. The rate of NSAID prescribing and supply then slowly declined to 5.2 per 100 encounters in 2003-04. The rate of coxibs prescribed/supplied increased significantly in the period 1999-00 to 2001-02 and remained at this higher level over the last three years. The rate of prescribing/supply of the other NSAIDs declined from 4.6 per 100 encounters in 1999-00 to around 2.9 per 100 encounters in 2001-02 to 2003-04.



The rate of all NSAIDs prescribed or supplied specifically for arthritis problems increased from 38.5 medications per 100 arthritis problems in 1999–00 to a peak of 53.8 per 100 arthritis problems in 2000–01. Since then the rates of NSAID medications prescribed or supplied steadily decreased to 48.4 medications per 100 arthritis problems in 2003–04. The initial increase was due to an increase in the rate of coxibs from 4.0 per 100 arthritis problems in 1999–00 to 33.9 per 100 arthritis problems in 2001–02. The last two years has seen a decrease in the prescription and supply of coxibs to 27.6 per 100 arthritis problems in 2003–04. At the same time, the rate of other NSAIDs prescribed or supplied decreased from 34.5 per 100 arthritis problems in 1999–00 to an average of 20 per 100 over the years 2001–02 to 2003–04. This changing pattern of medication management indicates that the increase in coxibs was largely responsible for an overall increase in the total NSAID medication rate for arthritis problems. The decrease in other NSAIDs indicates that there has been considerable substitution of coxibs for other NSAIDs. However, the 2002–03 figures indicate that the medication rates for arthritis, including coxibs, have declined steadily since the peak around 2001 (Figure 13.4).



(a) Includes multiple ICPC-2 codes for osteoarthritis and arthritis (see Appendix 3) and rheumatoid arthritis (ICPC rubric L88).

In 2003–04 the prescription/supply rate of NSAIDs for musculoskeletal problems other than arthritis has returned to the rate seen in 1998–99, before the introduction of coxibs (Figure 13.5). The medication rate of coxibs for other musculoskeletal problems peaked in 2001–02 (10.8 per 100 problems), while the rate of all other NSAIDs decreased. However, in the last two years there has been a decrease in the medication rate of coxibs for other musculoskeletal problems to 6.6 per 100 problems in 2003–04, while the medication rates of other NSAIDs have remained steady.

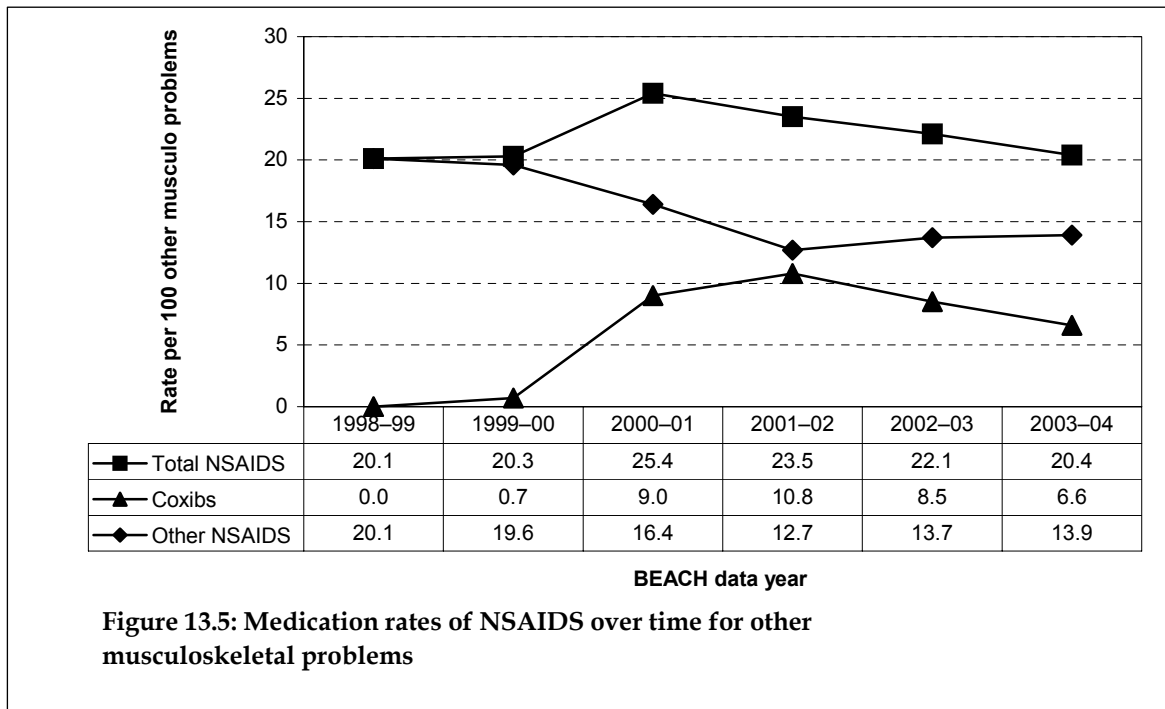
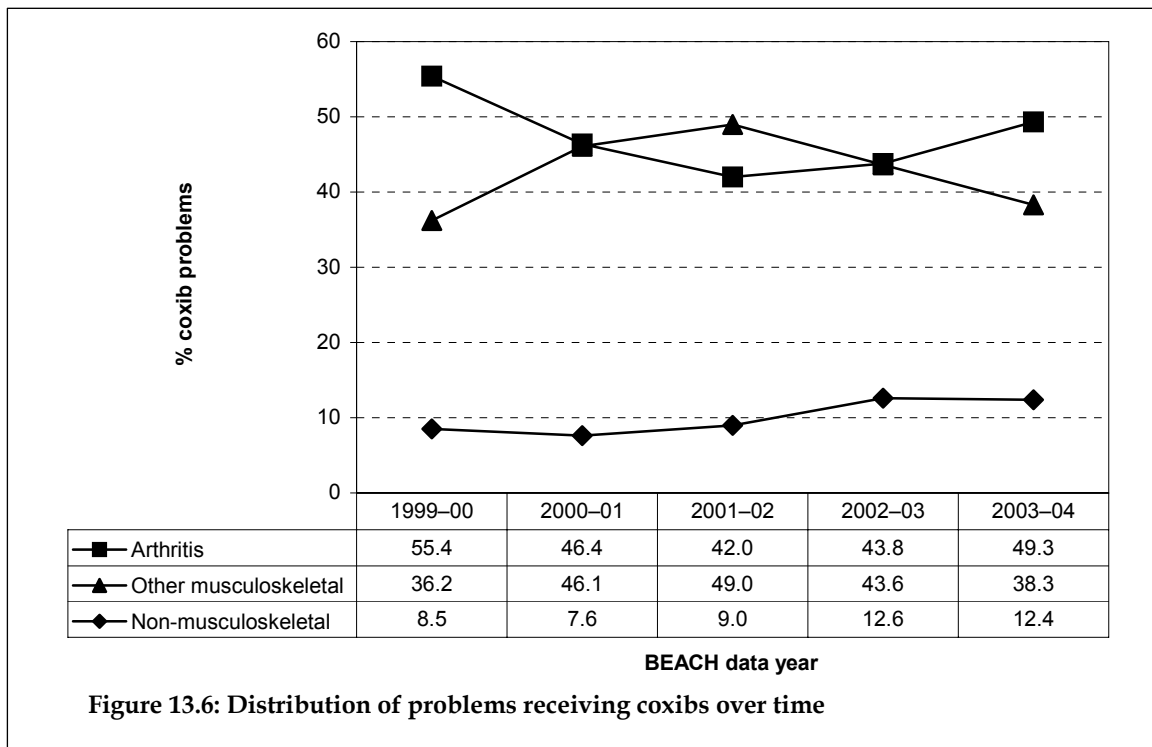


Figure 13.6 shows the distribution of the broad categories of problems for which coxibs were prescribed or supplied over time. In 1999-00, when coxibs began to be prescribed/supplied, 55.4% of the problems for which a coxib was prescribed or supplied were arthritis problems and 36.2% were other musculoskeletal problems. In 2001-02 only 42.0% of problems for which a coxib was prescribed or supplied were arthritis problems; however, by 2003-04 this had increased to 49.3%.



Multiple regression

All NSAIDs

Multiple regression, with the medication rate of total NSAIDs as the outcome, demonstrated a significant decrease in the prescribing/supply rate since 2000–01 ($p < 0.0001$). This decrease was apparent for both arthritis problems ($p = 0.001$) and other musculoskeletal problems ($p < 0.0001$).

Coxibs

Multiple regression, with the medication rate of coxibs as the outcome, demonstrated a significant decrease in the medication rate of coxibs since 2000–01 ($p < 0.0001$). This decrease was apparent for both arthritis problems ($p = 0.001$) and other musculoskeletal problems ($p < 0.0001$).

Conclusion

From 1999–00 to 2000–01, there was a marked increase in the medication rate for total NSAIDs for both arthritis problems and other musculoskeletal problems, an increase that was entirely explained by an increase in the medication rate of coxibs. There is evidence that, over the period, coxibs were substituted for other NSAIDs for both arthritis problems and other musculoskeletal problems. In 2003–04 around 28% of arthritis problems and around 7% of other musculoskeletal problems resulted in a coxib being supplied or prescribed at the encounter. However, the initial increase in the prescribing rate of total NSAIDs and the uptake of coxibs has significantly declined over the last three years.

13.3 Anti-depressant medications and the management of psychological problems over time

A problem was defined as depression if the GP recorded it as a depressive disorder (ICPC-2 rubric P76) or in terms of depressive symptoms (rubric P03). Depression was the fourth most common problem managed in general practice in 2003–04. It was managed at a rate of 3.7 per 100 encounters and accounted for 2.5% of problems managed. Extrapolating to 90 million general practice items claimed through Medicare in 2003–04, there were an estimated 3.3 million encounters in Australia where the GP managed depression.

‘All anti-depressant medications’ included the ATC medication group N06A.¹⁹ This was subdivided into selective serotonin re-uptake inhibitors (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.

Current status of depression

Figure 13.7 is a flow chart summarising the management of depression in 2003–04.

Patients

The majority of patients at depression encounters were female (67.0%), and the highest proportion of patients (36.6%) were between 25 and 44 years of age. Depression was

managed at a rate of 4.3 per 100 encounters with females and 2.8 per 100 encounters with males. Patients aged 25–44 years had the highest age-specific management rate (5.5 per 100 encounters) followed by those aged 45–64 years (4.6 per 100). The management rate of depression for adolescents and young adults was also high at 3.3 contacts per 100 encounters.

Patient reasons for encounter: Reasons for encounters were recorded at a rate of 176.0 per 100 depression encounters, much higher than the average of 150.2 per 100. Depression was the most common reason for encounter (43.9 per 100 depression encounters) and a large proportion of patients came for prescriptions (22.0 per 100). Anxiety (4.9 per 100 encounters), weakness/tiredness (4.8) and sleep disturbance (4.5) were common RFEs at depression encounters. The average rates for these conditions were 1.0, 1.5 and 1.2 respectively.

Other problems managed

There were 94.1 other problems managed per 100 depression encounters, giving a total of 194.1 problems managed per 100 depression encounters. This rate was much higher than the average of 146.3 per 100 encounters. Hypertension (8.9 per 100 encounters) and back complaint (2.8 per 100) were managed at a similar rate to the average for all BEACH encounters whereas the rate of oesophageal disease (3.5 per 100) was somewhat higher than the average rate of 2.2 per 100 encounters.

Management

Medication: Medication rates for depression, at 78.1 medications per 100 depression problems, were higher than the medication rates for all problems managed in BEACH (71.3 per 100). SSRIs were the most common type of medication prescribed for depression (41.7 per 100 depression problems) Sertraline (15.2 per 100 depression problems) and citalopram (10.8 per 100) were the most common SSRI medications. Other anti-depressants were prescribed at a rate of 24.5 per 100 problems, the most common being venlafaxine (9.9 per 100). Anxiolytics were also commonly prescribed (5.6 per 100 depression problems).

Non-pharmacological treatments: The rate of other treatments for depression (52.7 per 100 problems) was much higher than the average for all problems managed in BEACH due to the high rate of psychological counselling, which was given at a rate of 38.1 per 100 depression problems.

Tests and referrals: Pathology tests were ordered at a rate of 11.4 per 100 depression problems which was less than half the average for all problems managed at BEACH encounters (24.1 per 100 problems). Referrals were made at a rate of 8.5 per 100 problems, which was just on the national average for all problems managed.

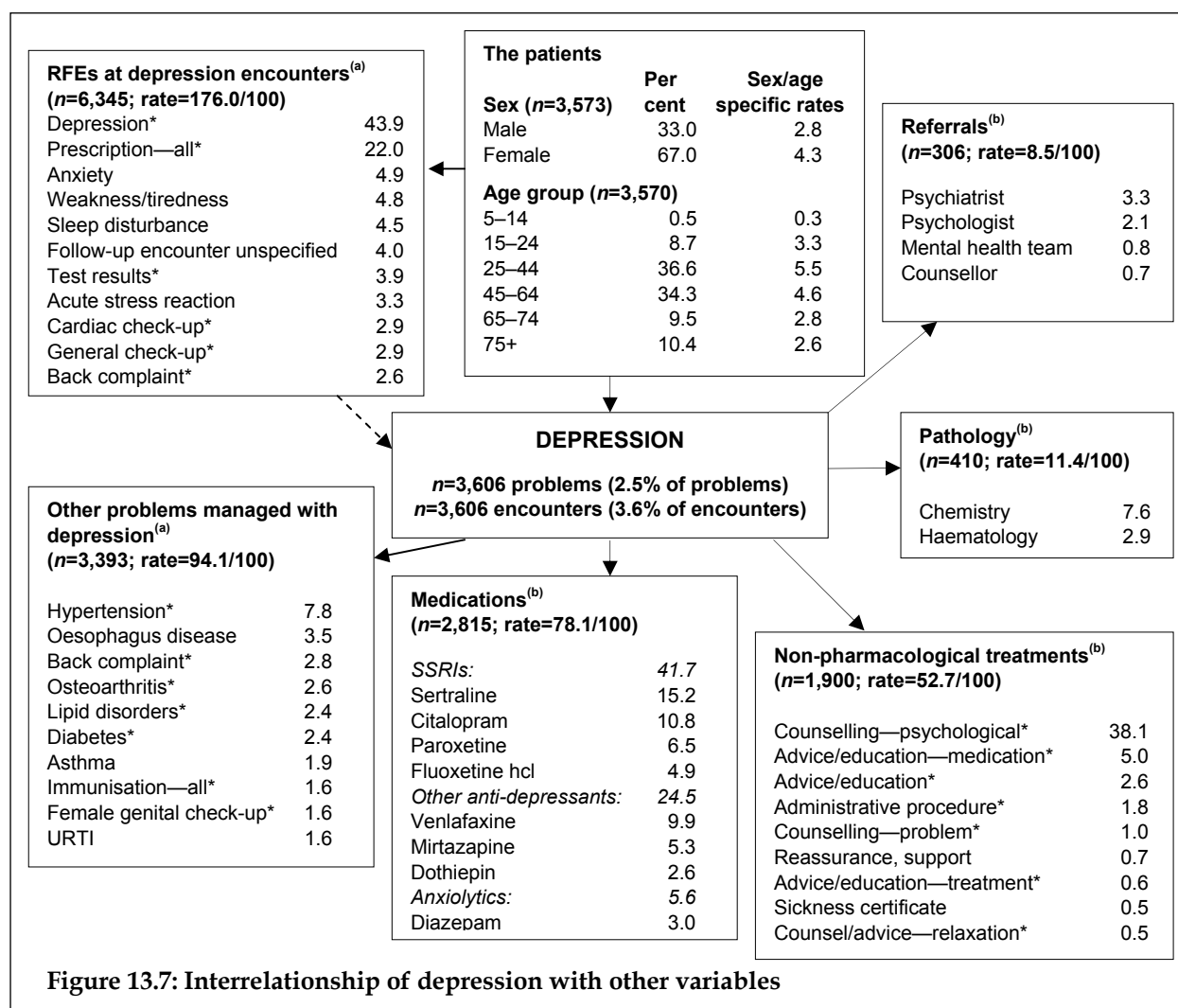


Figure 13.7: Interrelationship of depression with other variables

(a) Expressed as rates per 100 encounters at which depression was managed (n=3,606).

(b) Expressed as rates per 100 problems at which depression was managed (n=3,606).

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

Note: RFE—reason for encounter; URTI—upper respiratory tract infection; SSRI—selective serotonin re-uptake inhibitor

Changes over time

Figure 13.8 shows the overall management rates of depression and other psychological problems over time. The management of depression has remained steady at around 3.5 problems per 100 encounters. An extrapolation based on 90 million general practice items claimed through Medicare each year estimates that there were approximately 3.1 million encounters per year in Australia in which GPs managed depression. The management rate of other psychological problems has not changed over the six years of the study, remaining at around 7 problems per 100 encounters.

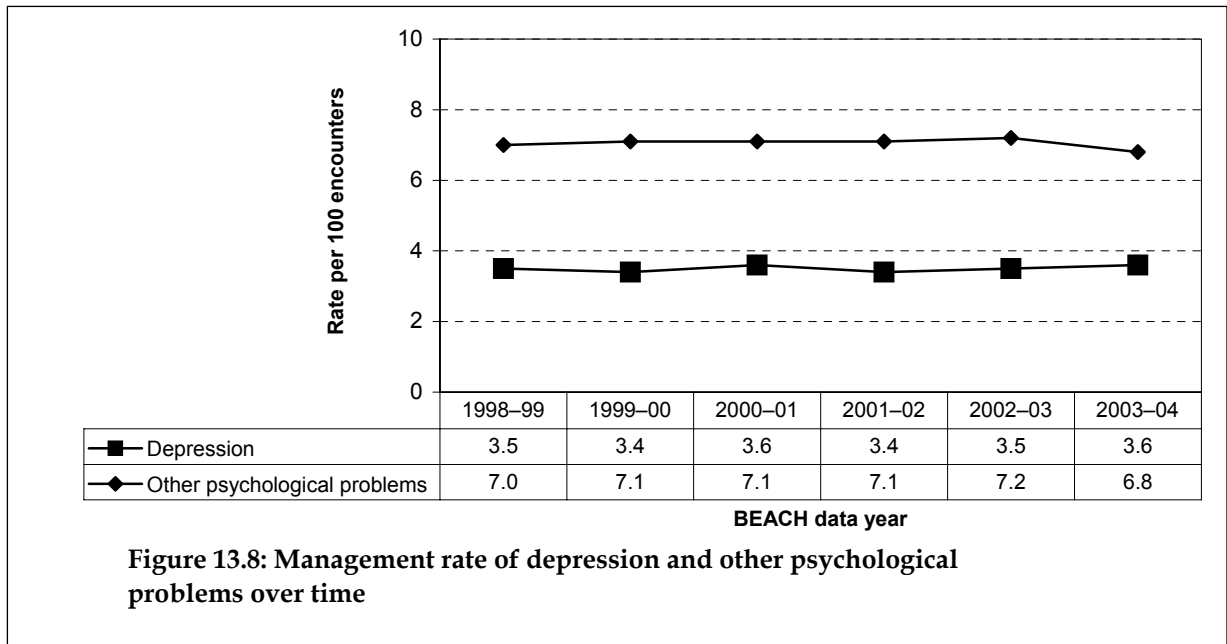
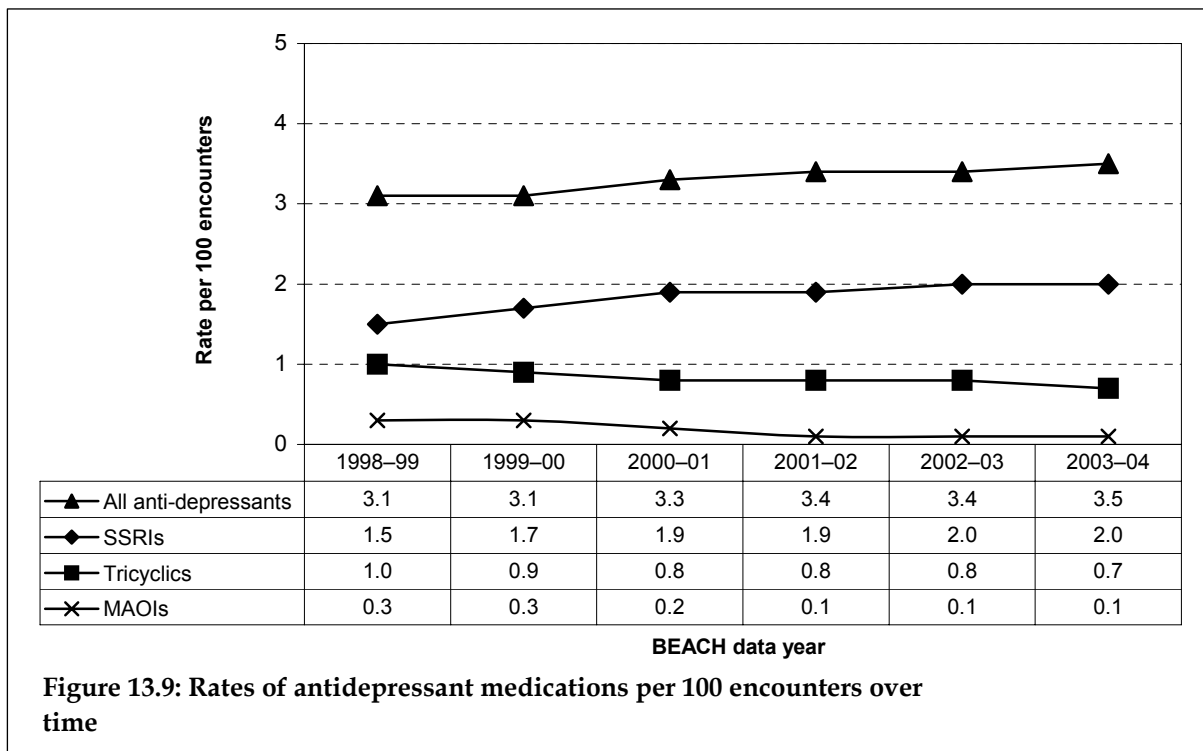
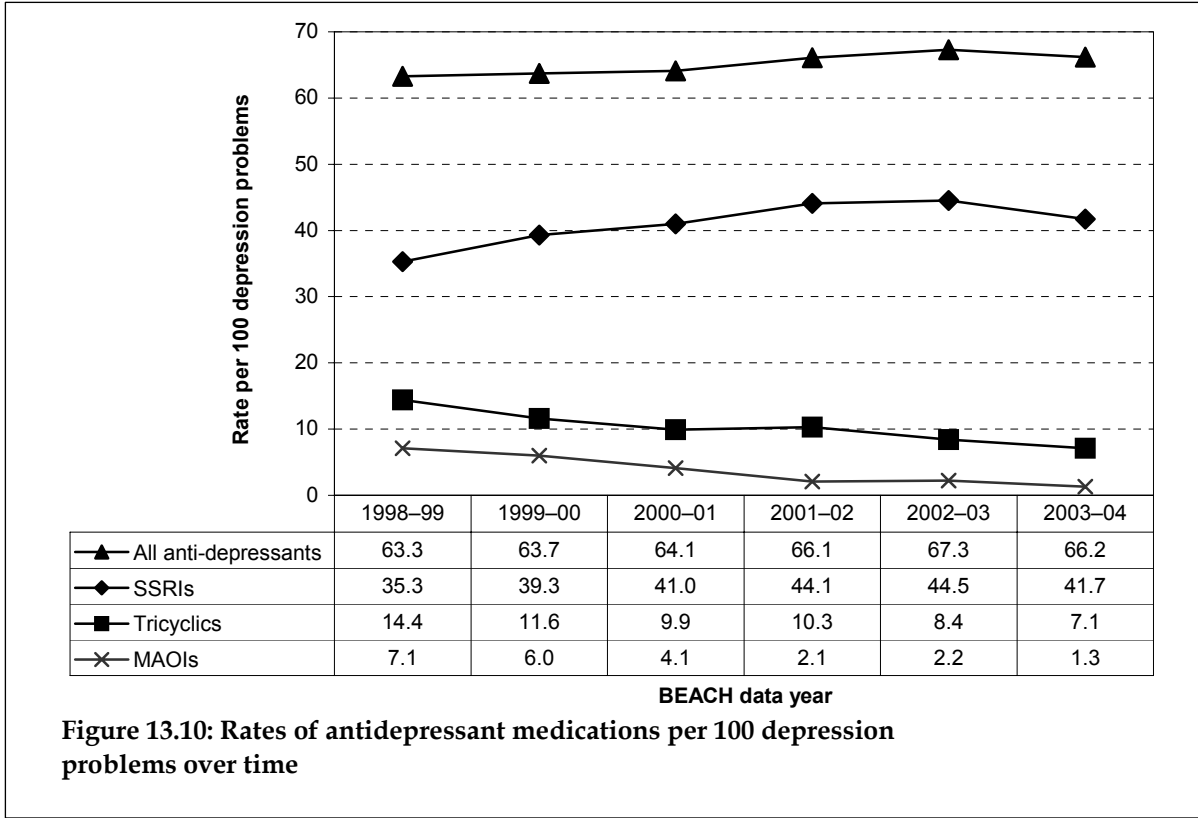


Figure 13.9 shows the overall rates of selected anti-depressant medications per 100 encounters, unadjusted for problem under management. The rates of anti-depressant medications increased somewhat from 3.1 per 100 encounters in 1998-99 to 3.5 per 100 encounters in 2003-04 ($p=0.001$). This increase was explained by a significant increase in the prescription/supply of SSRI medications from 1.5 per 100 encounters in 1998-99 to 2.0 per 100 in 2003-04 ($p<0.0001$). After adjusting for patient age and sex and extrapolating to 90 million GP-patient encounters annually, there has been an estimated average increase each year of 77,000 extra SSRIs medications prescribed or supplied in general practice.



The increase in the prescription/supply of SSRIs has been partly offset by a significant decrease over time in the rates of other anti-depressant medications, in particular the tricyclic anti-depressants ($p < 0.0001$) and MAOIs ($p < 0.0001$).

Figure 13.10 shows the rate of anti-depressant medications prescribed/supplied for the management of depression. The rate of anti-depressant medications for depression increased slightly over time from 63.3 per 100 depression problems in 1998–99 to 66.2 per 100 in 2003–04 ($p = 0.005$). This increase was explained by an increase in the rate of SSRIs from 35.3 per 100 problems in 1998–99 to 41.7 per 100 problems in 2003–04. The increase in SSRIs was accompanied by a significant decrease over the six years of the survey in the rates of tricyclic anti-depressants (from 14.4 per 100 depression problems to 7.1 per 100, $p < 0.0001$) and MAOIs (7.1 per 100 to 1.3 per 100, $p < 0.0001$). There was an increase in the rate of other anti-depressants for depression (6.5 per 100 depression problems to 16.1 per 100 problems, $p < 0.0001$) which was explained by an increase in the rate of selective noradrenaline re-uptake inhibitors (results not shown).



13.4 Asthma inhalant medications and management of asthma problems over time

Management of asthma in 2003–04

A problem was classified as asthma if the GP recorded it in the problem/diagnosis section of the form as asthma, allergic wheezy or asthmatic bronchitis, or status asthmaticus (ICPC-2 rubric R96). Asthma was the ninth most common problem managed in general practice in

2003–04. It was recorded at a rate of 2.6 per 100 encounters and accounted for 1.8% of problems managed. Extrapolating to 90 million general practice items claimed through Medicare in 2003–04, there were an estimated 2.3 million encounters in Australia at which GPs managed asthma.

Asthma inhalant medications were classified as bronchodilators/spasm relaxers or preventives. These categories cross various ATC codes and were defined using the Coding Atlas of Pharmaceutical Substances (CAPS) that distinguishes between bronchodilator inhalants and preventive inhalants. Rates of asthma medications include medications advised for OTC purchase as well as those prescribed or supplied by the GP.

Current status of asthma

Figure 13.11 is a flow chart summarising the management of asthma in 2003–04.

Patients

The majority of patients at asthma encounters were female, but the sex-specific rate of management of asthma did not differ between males (2.5 per 100 encounters) and females (2.6 per 100). Asthma was most often managed for children aged 5–14 years (6.8 per 100 encounters), followed by those aged less than 5 years (4.3 per 100). The age-specific rate of asthma decreased steadily with age in adults.

Patient reasons for encounter: Patients gave 4,294 reasons for encounter, a rate of 170 per 100 asthma encounters. At about one-third of encounters involving the management of asthma, the patient gave asthma as a reason for encounter. Cough was also a relatively common reason for encounter (26.5 per 100 asthma contacts), followed by requests for a prescription (20.0), shortness of breath and wheezing.

Other problems managed

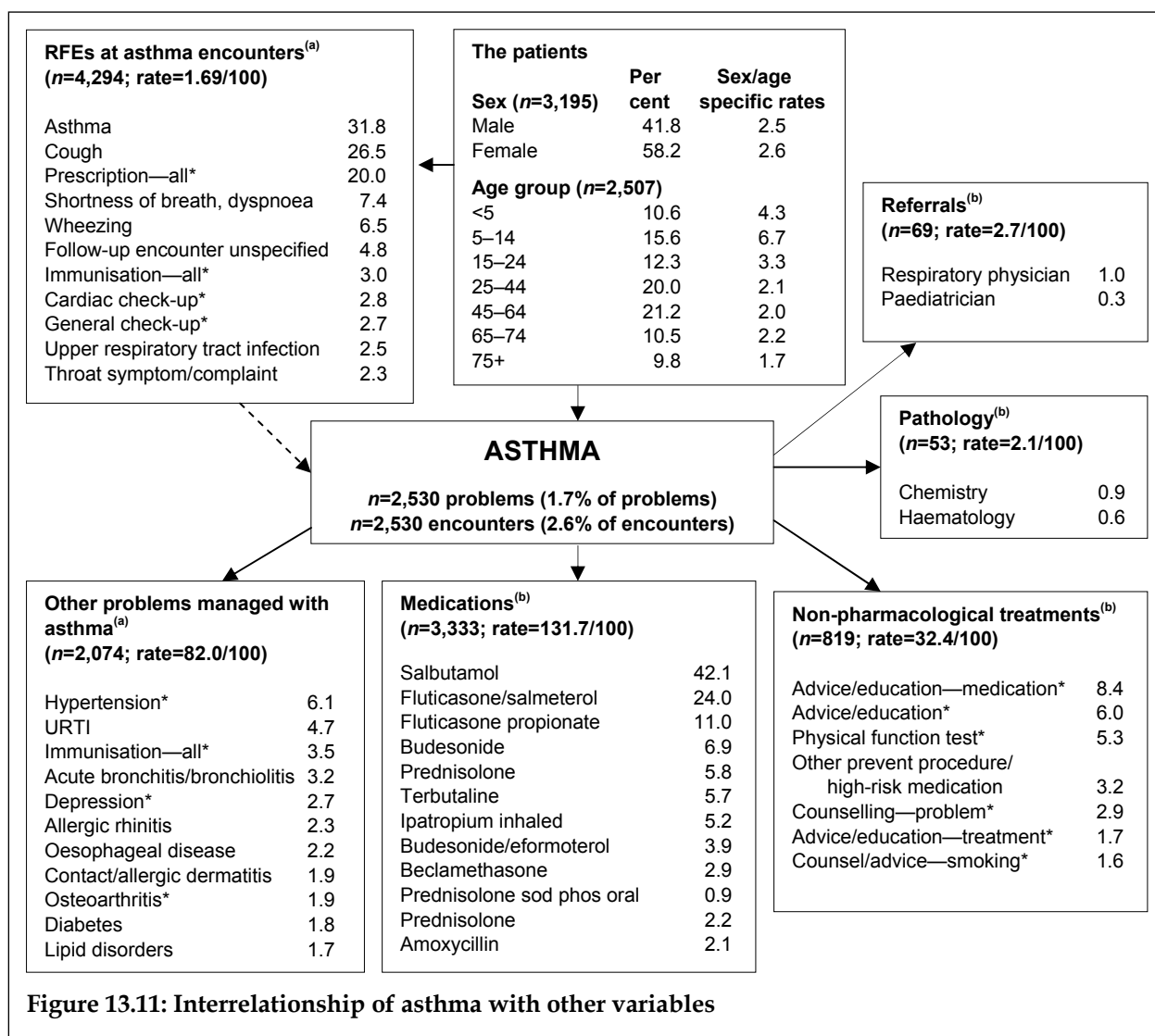
There were 2,074 other problems managed at these encounters, a rate of 82.0 other problems per 100 encounters. Hypertension (6.1 per 100 encounters) was the most common of these but this is likely to be due to its high management rate in the total database rather than to any specific relationship with asthma. This was followed by upper respiratory tract infection (4.7 per 100), immunisation/vaccination (3.5 per 100) and acute bronchitis (3.2).

Management

Medication: Medication rates for asthma, at 131.7 medications per 100 asthma contacts, were far higher than the average medication rate for all problems managed in BEACH (71.3 per 100). Salbutamol was the most common medication, provided at a rate of 42.1 per 100 asthma contacts, followed by fluticasone/salmeterol (24.0 per 100) and fluticasone propionate (11.0 (28.3 per 100 asthma problems)). However, there was a wide range of medications prescribed/supplied or advised for the management of asthma.

Non-pharmacological treatments: Other treatments were provided in the management of asthma at a rate of 32.4 per 100 contacts, a slightly lower rate than for all problems. The most common was advice and education about the medication (8.4 per 100 asthma contacts), followed by general advice and education (6.0 per 100), and then physical function tests (5.3 per 100).

Tests and referrals: Pathology tests were ordered at a very low rate of 2.1 per 100 asthma contacts and referrals were extremely rare.



(a) Expressed as rates per 100 encounters at which asthma was managed (n=2,530).

(b) Expressed as rates per 100 problems at which asthma was managed (n=2,530).

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

Note: RFE—reason for encounter; URTI—upper respiratory tract infection.

Changes over time

Over the six years of the BEACH study, the management rate of asthma problems has decreased steadily from 3.2 per 100 encounters in 1998–99 to 2.6 per 100 encounters in 2003–04 ($p < 0.0001$). After adjusting for patient age and sex and extrapolating to all Australian GP–patient encounters, asthma encounters in general practice have been decreasing since 1998–99 at an average rate of 100,000 fewer asthma encounters per year (Figure 13.12).

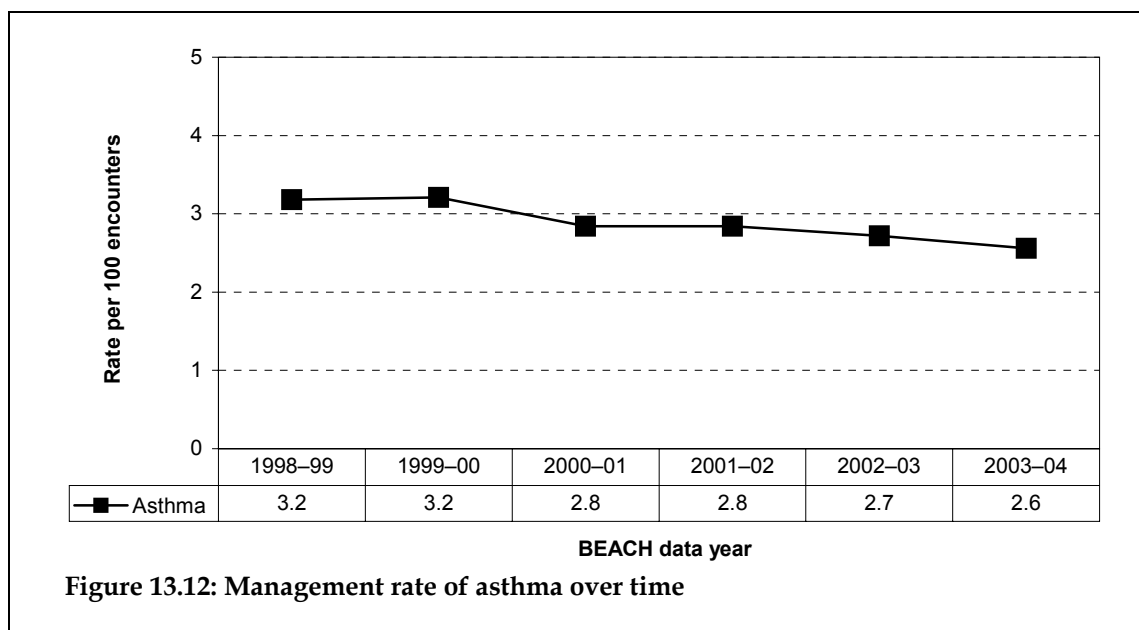


Figure 13.13 shows the rate of asthma medications per 100 encounters, unadjusted for the problem under management. There was a significant decrease in bronchodilators (prescribed, advised or supplied), from 3.9 per 100 encounters in 1998-99 to 2.2 per 100 encounters in 2003-04 ($p < 0.001$). After adjusting for patient age and sex, bronchodilator medication rates have been decreasing since 1998-99 at an average rate of 300,000 fewer occasions each year where the GP prescribed/advised or supplied bronchodilator medications. The decrease in preventive medications was much smaller, from 2.3 per 100 encounters in 1998-99 to 2.0 per 100 encounters in 2003-04 ($p < 0.0001$).

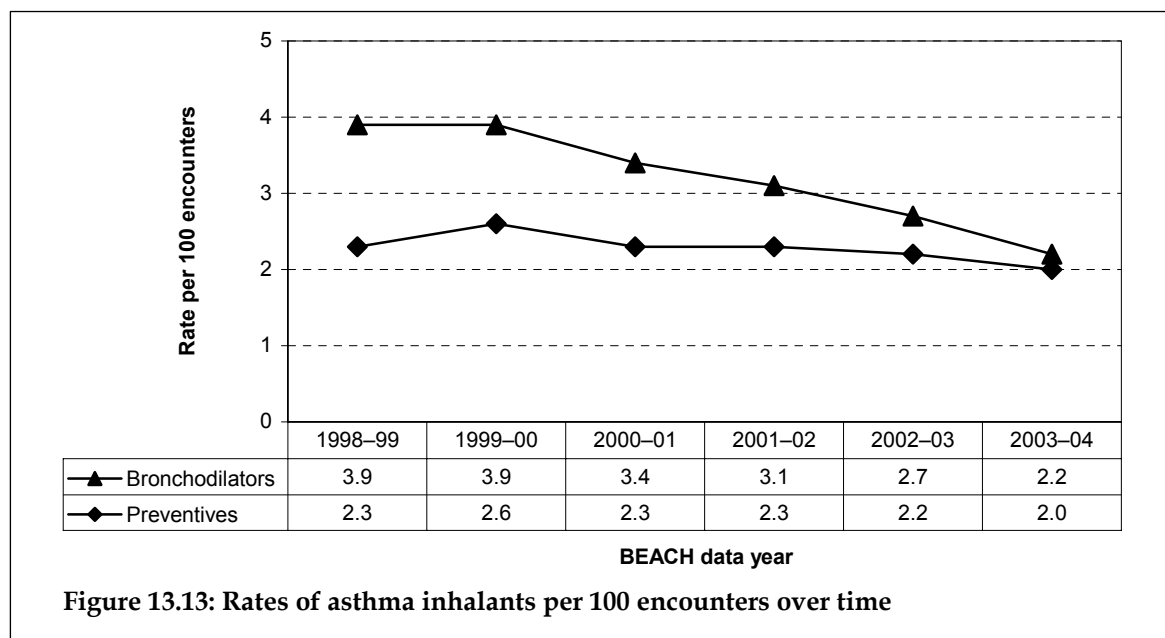
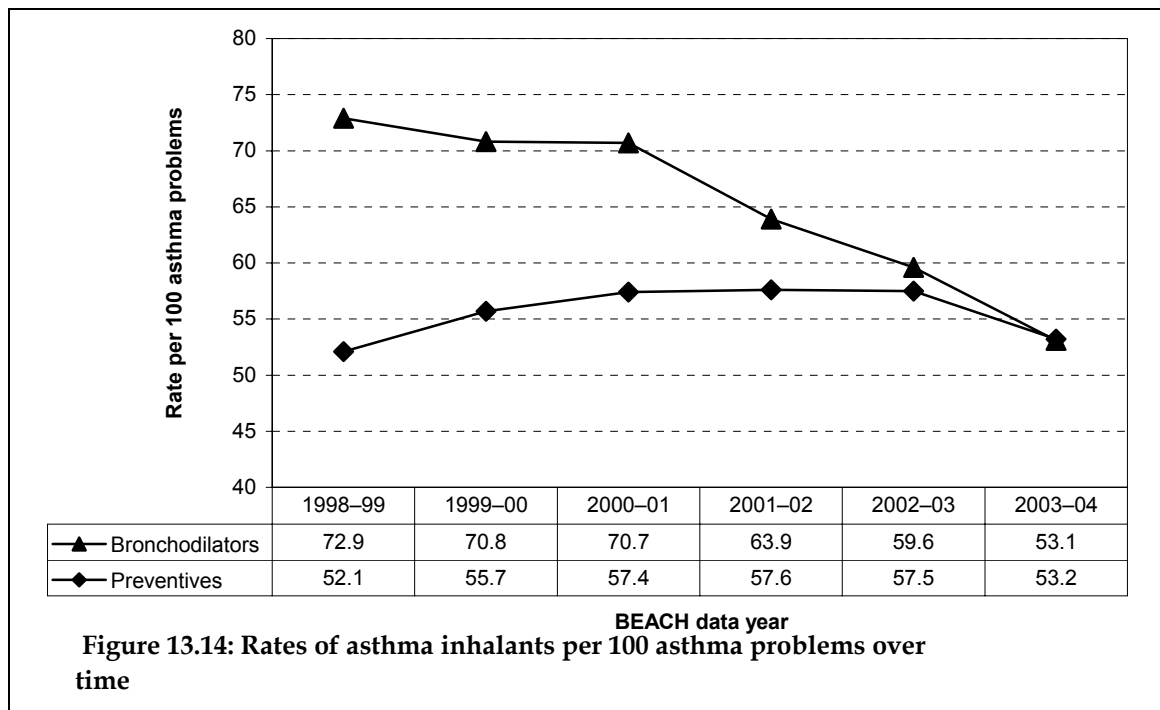


Figure 13.14 shows the medications prescribed/supplied or advised in the management of asthma problems. There was a significant decrease in the rate of bronchodilators over six years from 72.9 per 100 asthma problems in 1998–99 to 53.1 per 100 problems in 2003–04 ($p < 0.0001$). However, the rate of asthma preventives for asthma problems remained steady over the period, at around 55.5 medications per 100 asthma problems ($p = 0.49$).



Discussion

It appears that patients in Australia are visiting the GP less frequently for the management of asthma. A steady medication rate of asthma preventives for asthma problems plus a decreasing rate of bronchodilators may support the argument that patients are managing their asthma better, thus requiring fewer visits to the GP for acute exacerbations.⁴⁰ Another explanation for the results is that because patients are obtaining bronchodilators directly from pharmacists, they have less need to visit the GP for repeat scripts, thus reducing the management rate of asthma in general practice.

13.5 Lipid lowering agents and the management of lipid disorders over time

Management of lipid disorders in 2003–04

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 or raised lipids (ICPC-2 rubric T93). Lipid disorder was the sixth most common problem managed in general practice in 2003–04, recorded at a rate of 3.1 per 100 encounters and accounting for 2.1% of problems. An extrapolation based on 90 million general practice items claimed through Medicare each year estimates that there were

approximately 2.8 million encounters per year in Australia in which GPs managed lipid disorders.

Lipid lowering agents were defined as medications included under the ATC code C10A.¹⁹ For further analysis lipid lowering agents were divided into HMG CoA reductase inhibitors ('statins', ATC subgroup C10A A)¹⁹ and all other lipid lowering agents.

Current status of statins

Figure 13.15 is a flow chart describing the patients and problems for which statins were prescribed or supplied directly by the GP to the patient.

Rate of prescription or supply

There were 2,703 occasions on which statins were prescribed or supplied, accounting for 2.6% of all medications prescribed, supplied or advised. They were given at a rate of 2.7 per 100 total encounters and at a rate of 1.9 per 100 total problems. Atorvastatin was the most common statin accounting for 44.6% of all the statins. Simvastatin accounted for a further 39.6% of the statin group. The median prescribed daily dose for both atorvastatin and simvastatin was 20 mg.

The patients

The sex distribution of the patients differed from that of the total sample, with males and females each accounting for 50% of the sample. Males were more likely to receive this medication (3.2 per 100 encounters) than females (2.4 per 100). Patients over the age of 44 years accounted for more than 90% of those receiving a statin, almost half of these being aged 45–64 years and half being older people. Those aged between 65 and 74 years were the most likely to receive this medication (6.8 medications per 100 contacts with patients in this age group), followed by those aged 75 years or more (4.2 per 100 encounters) and those aged between 45 and 64 years (4.1 per 100).

Reasons for encounter: The most common patient reason for encounter was a request for a prescription (described at a rate of 50.6 per 100 statin encounters), followed by requests for cardiac check-ups (13.8 per 100) and test results (13.7 per 100).

Problems managed

Lipid disorders were the most common problem managed with statins, accounting for more than two-thirds of the statin encounters (69.4 per 100 statin encounters). 'Prescription' (without a more specific problem label) was the second most frequent problem resulting in a statin being prescribed or supplied (8.8 per 100 statin encounters). It is likely these are related to prevention in patients without a high cholesterol reading. This was followed by ischaemic heart disease (7.0 per 100) and then by a range of other cardiovascular and endocrine/metabolic problems.

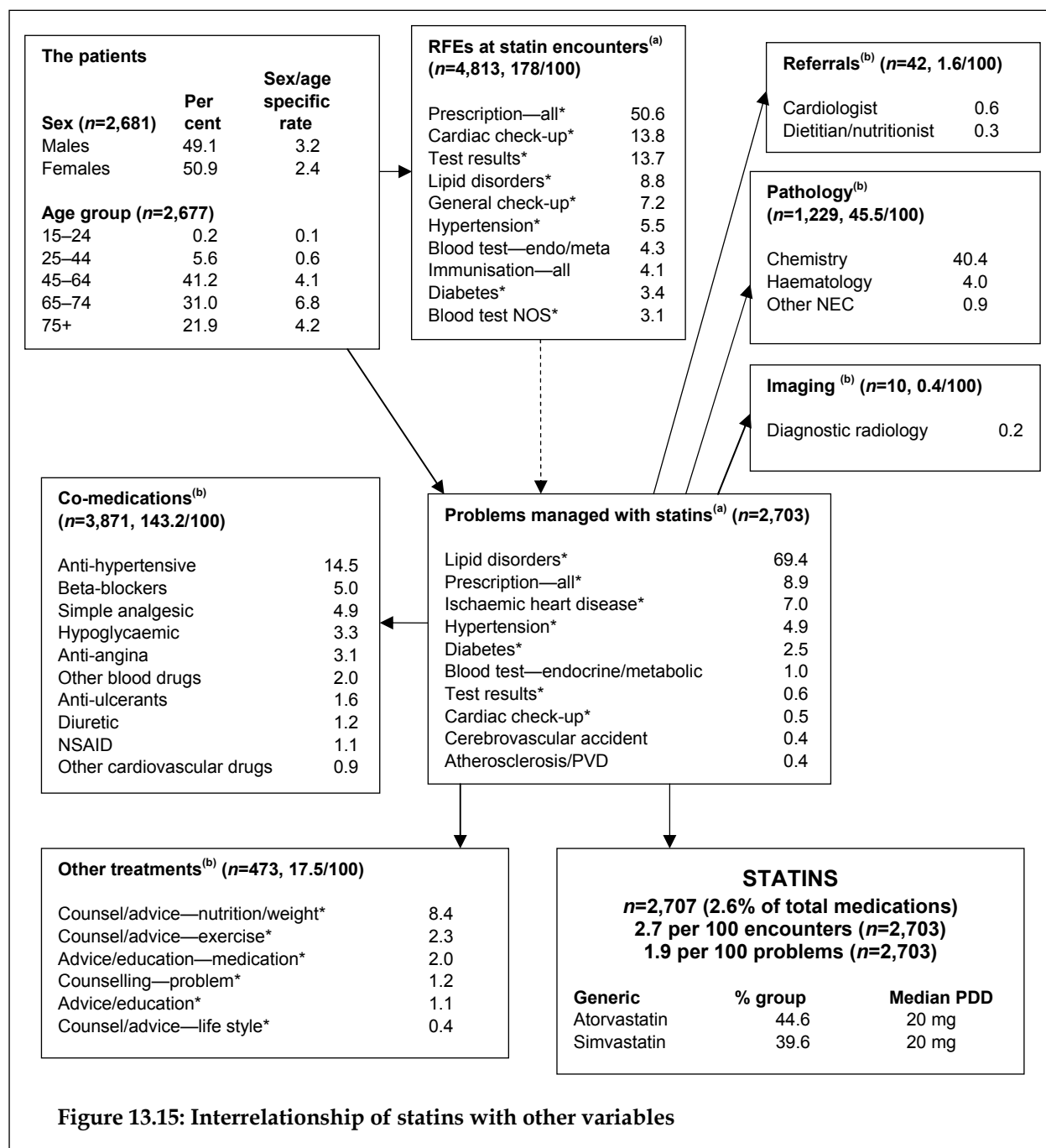
Other management

Other medications: A total of 3,871 other medications were prescribed, supplied or recommended at the same encounter, for the same problem for which the statins were used. Anti-hypertensives were the most common co-medications (14.5 per 100 statin problems), followed by beta-blockers (5.0 per 100) and simple analgesics (4.9 per 100 problems).

Non-pharmacological: Other treatments were utilised less often for statin problems than for all problems (17.5 per 100 problems managed with statins, compared with 35.1 per 100 total

problems). Counselling/advice about nutrition and weight was most common (8.4 per 100 statin problems), followed by counselling/advice about exercise (2.3 per 100).

Referrals and investigations: The patient was referred to other health professionals for statin problems at a rate of 1.6 per 100 problems managed. Pathology was ordered at a very high rate of 45.5 per 100 statin problems. This was largely due to the ordering of Chemistry tests (including lipid profiles and liver function tests) (40.4 per 100 problems). There were very few imaging tests ordered for these problems (0.4 per 100 problems).



(a) Expressed as rates per 100 encounters at which statins were used (n=2,703).

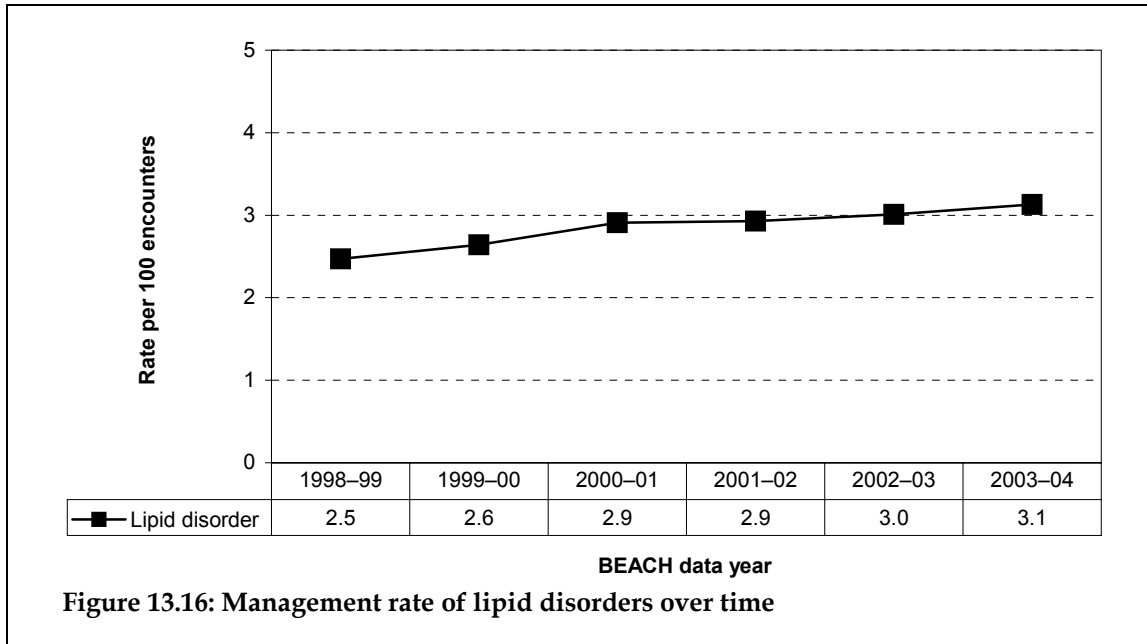
(b) Expressed as rates per 100 problems for which statins were used (n=2,703).

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

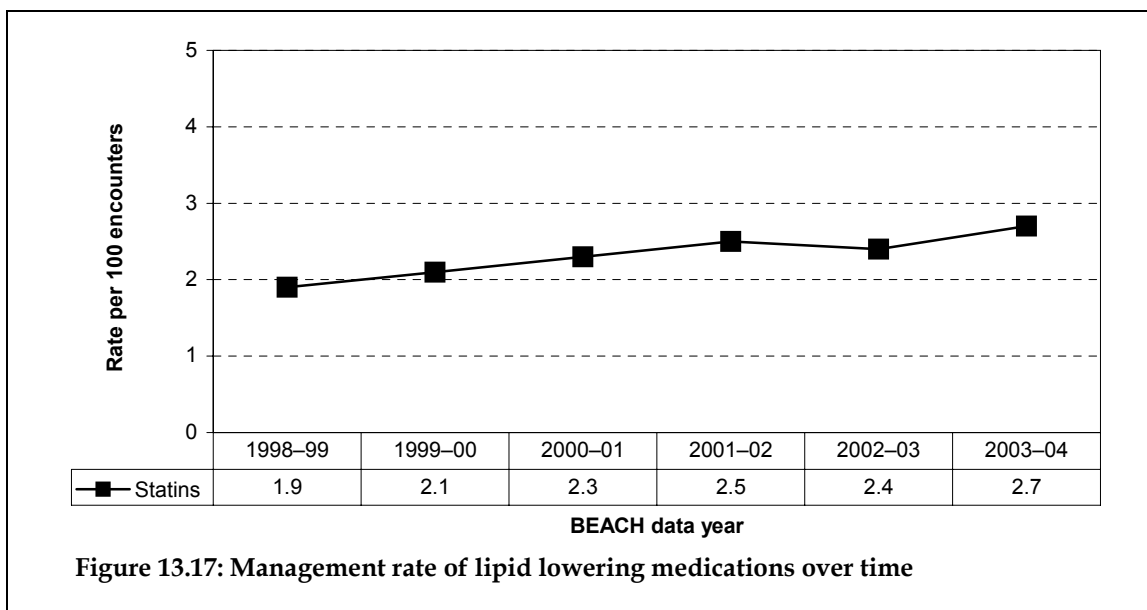
Note: RFEs—reasons for encounter; NSAID—non-steroidal anti-inflammatory drug; PVD—peripheral vascular disease; endo/meta—endocrine/metabolic; PDD—prescribed daily dose.

Changes over time

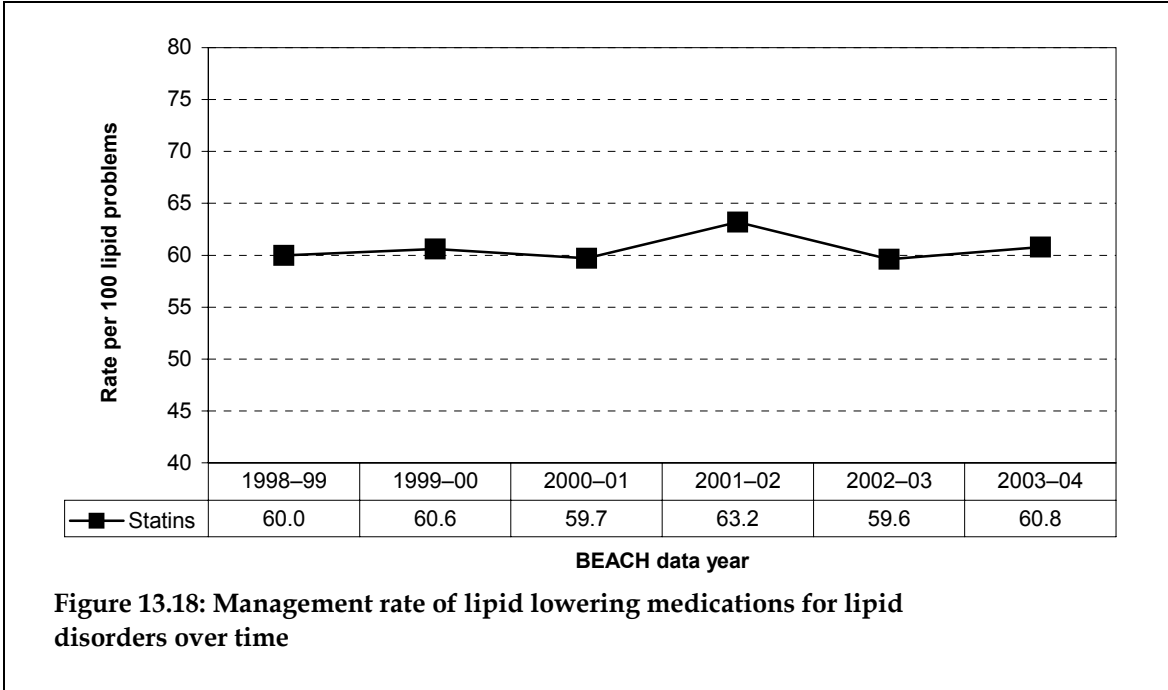
The management of lipid disorders increased significantly from 1998–99 (2.5 per 100 encounters) to 2003–04 (3.1 per 100 encounters, $p < 0.0001$). After adjustment for patient age and sex, this was equivalent to an estimated increase of 75,000 extra lipid problems managed each year (Figure 13.16).



The rate of statins prescribed or supplied increased from 1.9 medications per 100 encounters in 1998–99 to 2.7 per 100 encounters in 2003–04 ($p < 0.0001$). After adjustment for patient age and sex this was equivalent to an estimated 100,000 extra occasions each year where a GP prescribed or supplied statin medications (Figure 13.17).



The increase in lipid medications was entirely explained by the increase in the management of lipid disorders. There has been no significant change in the rate of statins prescribed or supplied for the management of lipid disorder problems (Figure 13.18). Since 1998–99 statins have been prescribed/supplied at around 61 medications per 100 lipid disorder problems ($p=0.86$).



13.6 The management of diabetes over time

For the purpose of this analysis diabetes includes insulin dependent (ICPC-2 rubric T89) and non-insulin dependent diabetes (ICPC-2 rubric T90), but excluded gestational diabetes. In 2003–04 non-gestational diabetes was managed at a rate of 3.3 problems per 100 encounters. An extrapolation based on 90 million general practice items claimed through Medicare in 2003–04 estimates that there were approximately 3.0 million encounters per year in Australia in which GPs managed diabetes.

Current status of diabetes

Figure 13.19 is a flow chart summarising the management of diabetes in 2003–04.

Patients

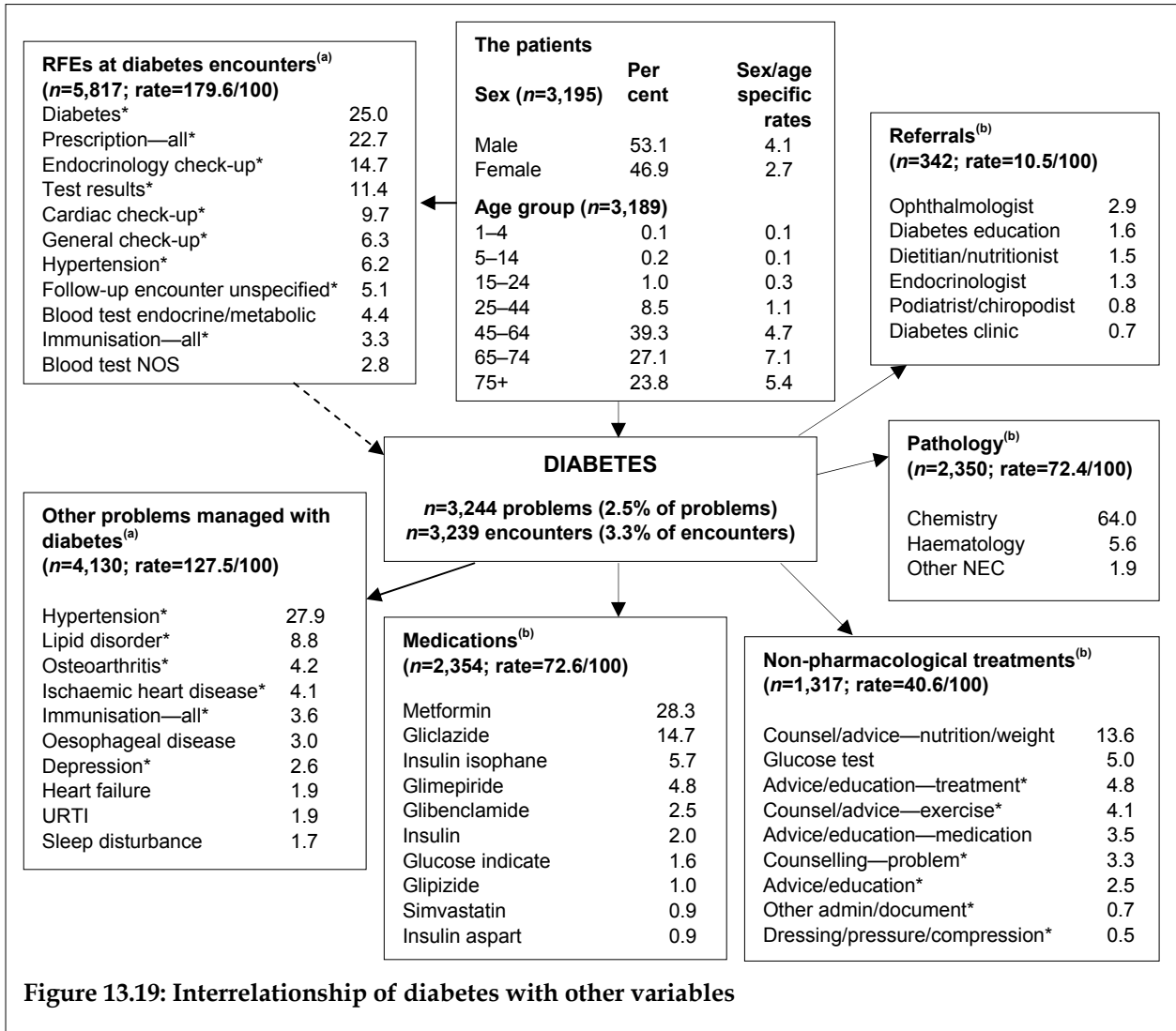
The majority of patients at diabetes encounters were male and more than 90% were aged 45 years and over. Diabetes was managed more frequently for males (at 4.1% of encounters with male patients) than for females (2.7% of encounters with female patients), and for older patients (17.2% of encounters with patients aged 45 years and over).

Patient reasons for encounter: There were significantly more patient reasons for encounter (180 per 100 encounters) than the average for BEACH (150 per 100 encounters). Although

diabetes was the most common reason for encounter, a large proportion of patients requested prescriptions or endocrinology tests as a reason for encounter.

Other problems managed

There were 127.5 other problems managed per 100 diabetes encounters. This means that, on average, 228 problems were managed for every 100 encounters where diabetes was managed. This rate is significantly higher than 146.3 problems per encounter recorded for BEACH. Hypertension (27.9 per 100 encounters), lipid disorder (8.8 per 100), osteoarthritis (4.2 per 100) and ischaemic heart disease (4.1 per 100) were managed at diabetes encounters far more frequently than average for all BEACH encounters (9.2, 3.3, 2.8 and 1.4 per 100 encounters respectively). The older age of patients at diabetes encounters probably accounts for the higher rates of chronic disorders such as osteoarthritis and ischaemic heart failure managed at these encounters.



(a) Expressed as rates per 100 encounters at which diabetes was managed (n=3,239).
 (b) Expressed as rates per 100 diabetes problems (n=3,244).
 * Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 3).
 Note: RFE—reason for encounter; NOS—not otherwise specified; NEC—not elsewhere classified; URTI—upper respiratory tract infection.

Management

Medication: Medication rates for diabetes, at 72.6 medications per 100 diabetes problems, were similar to medication rates for all problems managed in BEACH (71.3 per 100). Metformin (28.3 per 100 diabetes problems) and gliclaxide (14.7 per 100) were the most common medications prescribed for diabetes, followed by insulin isophane (5.7 per 100).

Non-pharmacological treatments: The rate of other treatments for diabetes (40.6 per 100 problems) was slightly higher than the average for all problems managed in BEACH. The most common were counselling/advice–nutrition/weight, followed by glucose test, advice/education–treatment, and counselling/advice–exercise.

Tests and referrals: Pathology tests were ordered at a rate of 21.2 per 100 diabetes problems which was close to double the average for all problems managed at BEACH encounters (11.9 per 100 problems). Nearly two-thirds of pathology requests were for chemistry, which was the most common pathology test ordered. Referrals were made at a rate of 10.5 per 100 problems, which was slightly higher than the BEACH average (8.0 per 100 problems). The most common referral was to an ophthalmologist.

Changes over time

Figure 13.20 shows the management of non-gestational diabetes, which increased from 2.6 per 100 encounters in 1998–99 to 3.3 per 100 encounters in 2003–04 ($p < 0.0001$). After adjusting for patient age and sex this was equivalent to an estimated increase of 75,000 extra diabetes problems managed each year.

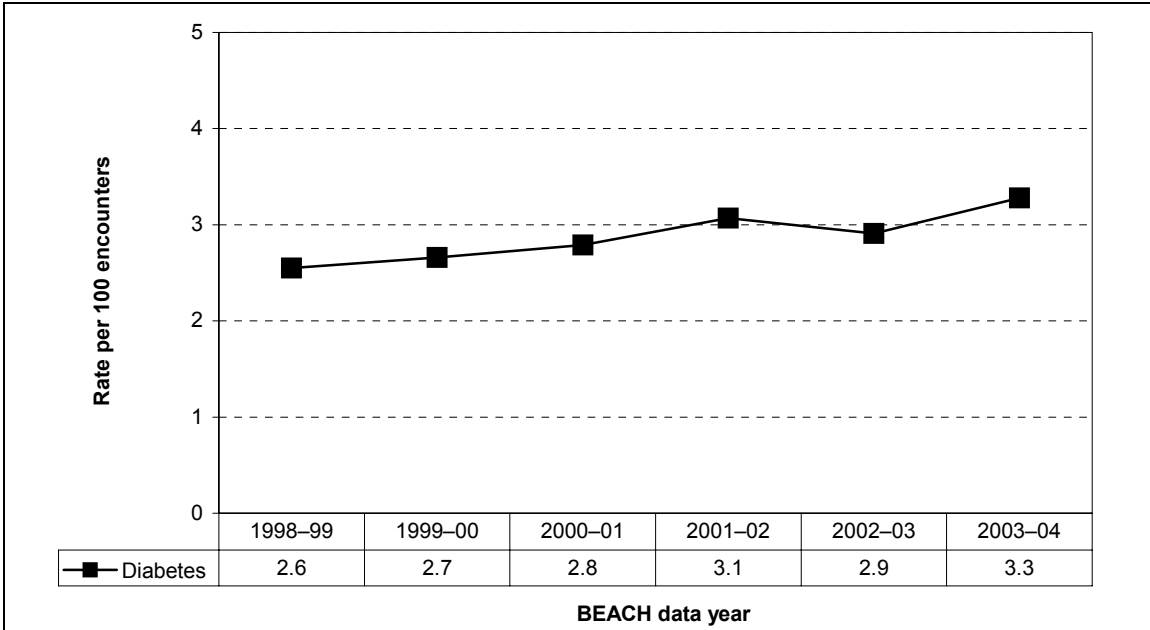


Figure 13.20: Management rate of diabetes problems over time