

9 Medications

GPs could record up to four medications for each of four problems – a maximum of 16 medications per encounter. Each medication could be recorded as prescribed (the default), supplied by the GP or recommended for over-the-counter (OTC) purchase.

- GPs were asked to:
 - enter the generic or brand name, the strength, regimen and number of repeats ordered for each medication
 - designate this as a new or continued medication for this patient for this problem.
- Generic or brand names were entered into the database in the form recorded by the GP.
- Medications were coded using the Coding Atlas of Pharmaceutical Substances (CAPS) system (developed by the FMRC) from which they were mapped to the international Anatomical Therapeutic Chemical (ATC) classification.³⁰
- Results are reported in this chapter at drug group, subgroup and generic level using ATC levels 1, 3 and 5. Individual medications are also reported at the CAPS generic level, the equivalent of ATC Level 5 (see Section 2.7).

Data on medications are reported for each year from 1998–99 to 2007–08 in the 10 year summary report *General practice activity in Australia 1998–99 to 2007–08: 10 year data tables* available from <www.aihw.gov.au/publications/index.cfm/subject/19> (AIHW catalogue number GEP 23).

Readers interested in adverse drug events will find more detailed information from the BEACH program in Miller et al. *Adverse drug events in general practice patients in Australia*.⁵⁸

9.1 Source of medications

A total of 98,439 medications were recorded, at rates of 103 per 100 encounters and 68 per 100 problems managed (Table 8.1).

- Four out of five medications (80.3% of all medications) were prescribed.
- One in ten (9.9%) medications were supplied to the patient by the GP.
- One in ten medications (9.8%) were recommended by the GP for OTC purchase.

If these are extrapolated to the 107 million general practice Medicare-claimed encounters in Australia in 2007–08, GPs in Australia:

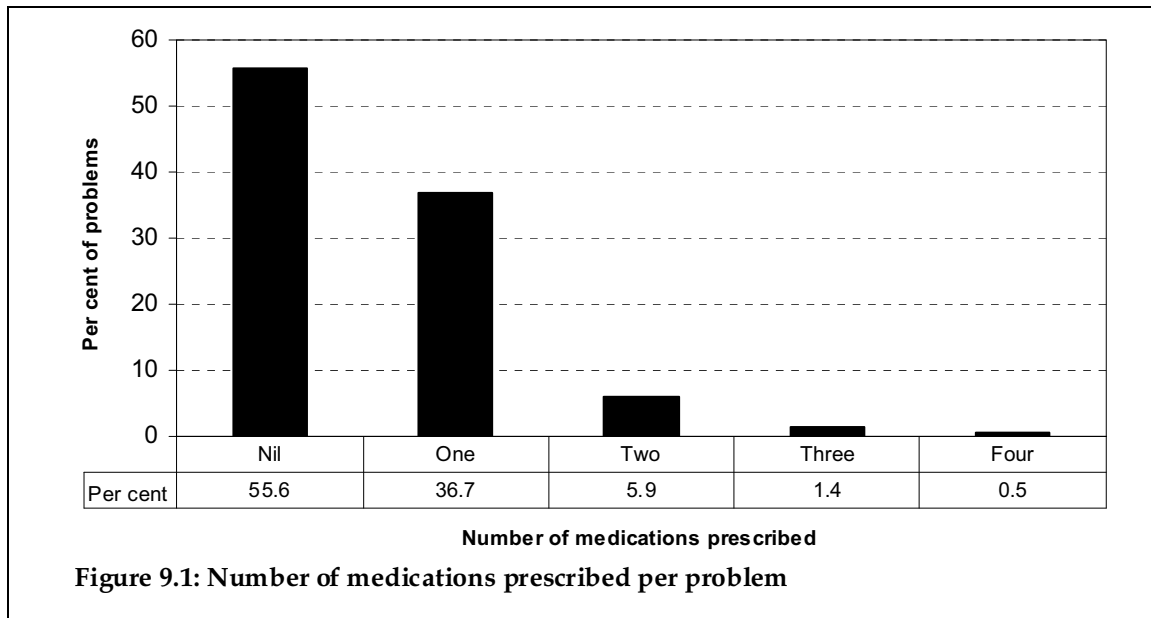
- prescribed medications on more than 88 million occasions
- supplied 10.8 million medications directly to the patient
- recommended medications for OTC purchase on 10.8 million occasions.

9.2 Prescribed medications

There were 79,051 prescriptions recorded, at rates of 82 per 100 encounters and 55 per 100 problems managed. GPs recorded 86.1% of prescribed medications by brand (proprietary) name and 13.9% by their generic (non-proprietary) name (results not tabled).

On a per problem basis:

- no prescription was given for half (55.6%) of all problems managed
- one prescription was given for 36.7% of problems managed
- two prescriptions were given for 5.9% of problems managed
- three or more prescriptions were rarely given (1.9% of problems managed) (Figure 9.1).



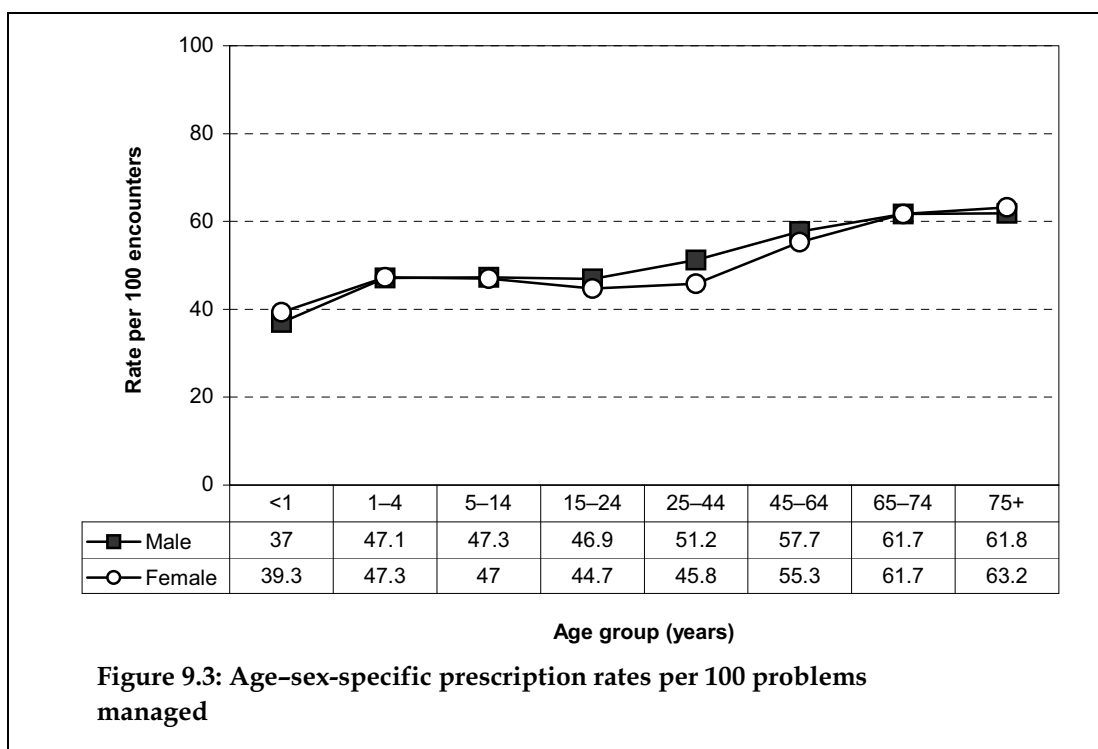
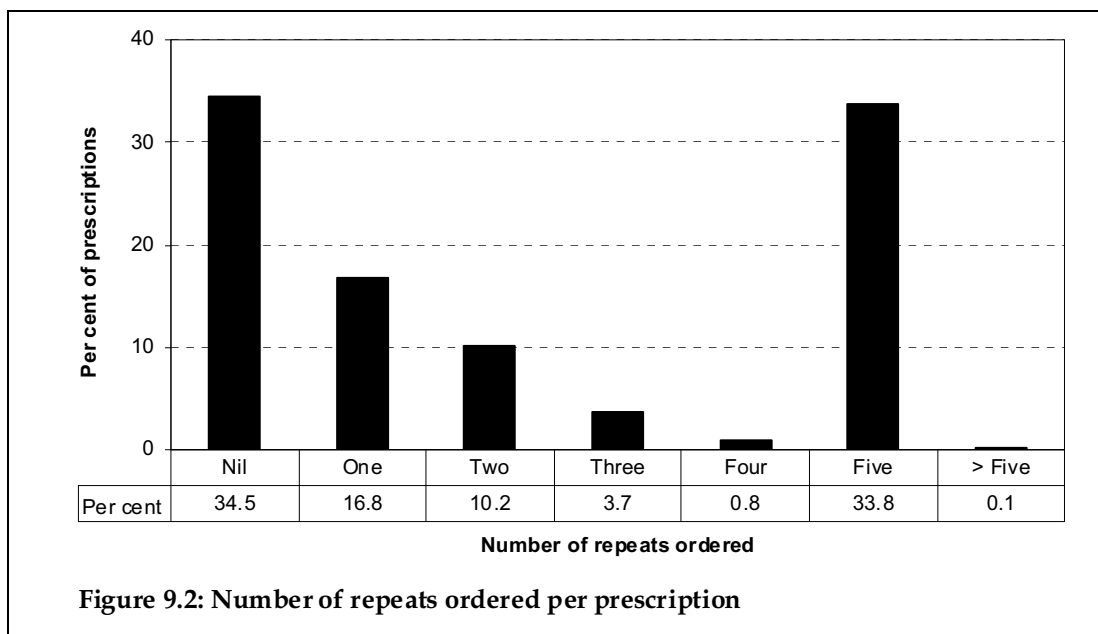
Number of repeats

For 60,733 prescriptions (76.8% of all prescriptions) the GPs recorded ‘number of repeats’. The distribution of the specified number of repeats (from nil to more than five) is provided in Figure 9.2. For 34.5% of these prescriptions, the GP specified that no repeats had been prescribed, and for 33.8% five repeats were ordered. The latter proportion reflects the PBS provision of one month’s supply and five repeats for many medications used for chronic conditions such as hypertension. The ordering of one or two repeats (16.8% and 10.2%) was also quite common.

Age–sex-specific rates of prescribed medications

Age–sex-specific analysis found similar prescription rates per 100 encounters for males and females (82.1 and 82.7, respectively). It also showed the well-described tendency for the number of prescriptions written at each encounter to rise with the advancing age of the patient, with a rate of 56 per 100 encounters with patients aged less than 25 years rising to 110 per 100 encounters for patients aged 65 years and over (results not tabled).

Figure 9.3, however, demonstrates that the age-based increase lessens 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 they have managed at an encounter.



Types of medications prescribed

Table 9.1 shows the distribution of prescribed medications using the WHO ATC classification.³⁰ This allows comparison with other data sources such as those produced by Medicare Australia for PBS data. The table lists medications in frequency order within ATC levels 1, 3 and 5. Prescriptions are presented as a percentage of total prescriptions and as a rate per 100 encounters with 95% confidence intervals.

Table 9.1: 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 = 79,051)	Rate per 100 encs ^(a) (n = 95,898)	95% LCL	95% UCL
Nervous system			17,051	21.6	17.8	17.1	18.5
	Other analgesics and antipyretics		4,933	6.2	5.1	4.8	5.5
		Paracetamol	2,381	3.0	2.5	2.2	2.7
		Paracetamol combinations excl. psycholeptics	1,922	2.4	2.0	1.8	2.2
		Acetylsalicylic acid	622	0.8	0.7	0.6	0.7
	Antidepressants		3,254	4.1	3.4	3.2	3.6
		Sertraline	586	0.7	0.6	0.5	0.7
	Opioids		2,921	3.7	3.1	2.8	3.3
		Oxycodone	989	1.3	1.0	0.9	1.2
		Tramadol	817	1.0	0.9	0.8	0.9
	Anxiolytics		1,855	2.4	1.9	1.7	2.1
		Diazepam	1,057	1.3	1.1	1.0	1.2
		Oxazepam	537	0.7	0.6	0.5	0.6
	Hypnotics and sedatives		1,592	2.0	1.7	1.5	1.8
		Temazepam	1,054	1.3	1.1	1.0	1.2
		Venlafaxine	531	0.7	0.6	0.5	0.6
	Antipsychotics		1,056	1.3	1.1	1.0	1.2
		Prochlorperazine	544	0.7	0.6	0.5	0.6
	Antiepileptics		516	0.7	0.5	0.5	0.6
Cardiovascular system			15,863	20.1	16.5	15.6	17.5
	Lipid modifying agents, plain		3,407	4.3	3.6	3.3	3.8
		Atorvastatin	1,664	2.1	1.7	1.6	1.9
		Simvastatin	879	1.1	0.9	0.8	1.0
	ACE inhibitors, plain		2,487	3.2	2.6	2.4	2.8
		Perindopril	1,133	1.4	1.2	1.1	1.3
		Ramipril	772	1.0	0.8	0.7	0.9
	Angiotensin ii antagonists, plain		2,114	2.7	2.2	2.0	2.4
		Irbesartan	919	1.2	1.0	0.9	1.1
		Candesartan	597	0.8	0.6	0.5	0.7
		Telmisartan	503	0.6	0.5	0.4	0.6
	Beta blocking agents		1,651	2.1	1.7	1.6	1.9
		Atenolol	835	1.1	0.9	0.8	1.0
	Selective calcium channel blockers with mainly vascular effects		1,510	1.9	1.6	1.4	1.7
		Amlodipine	689	0.9	0.7	0.6	0.8
	Angiotensin ii antagonists, combinations		1,215	1.5	1.3	1.1	1.4
		Irbesartan and diuretics	723	0.9	0.8	0.7	0.9

(continued)

Table 9.1 (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 = 79,051)	Rate per 100 encs ^(a) (n = 95,898)	95% LCL	95% UCL
	High-ceiling diuretics		584	0.7	0.6	0.5	0.7
		Furosemide	581	0.7	0.6	0.5	0.7
	ACE inhibitors, combinations		551	0.7	0.6	0.5	0.6
	Selective calcium channel blockers with direct cardiac effects		497	0.6	0.5	0.5	0.6
Anti-infectives for systemic use			15,219	19.3	15.9	15.3	16.5
	Beta-lactam antibacterials, penicillins		5,930	7.5	6.2	5.9	6.5
		Amoxicillin	3,330	4.2	3.5	3.2	4.2
		Amoxicillin and enzyme inhibitor	1,648	2.1	1.7	1.6	1.9
	Other beta-lactam antibacterials		2,962	3.8	3.1	2.9	3.3
		Cefalexin	2,333	3.0	2.4	2.3	2.6
		Cefaclor	565	0.7	0.6	0.5	0.7
	Macrolides, lincosamides and streptogramins		2,168	2.7	2.3	2.1	2.5
		Roxithromycin	1,174	1.5	1.2	1.1	1.4
	Viral vaccines		954	1.2	1.0	0.9	1.1
	Tetracyclines		822	1.0	0.9	0.8	1.0
		Doxycycline	702	0.9	0.7	0.6	0.8
	Sulfonamides and trimethoprim		622	0.8	0.7	0.6	0.7
Alimentary tract and metabolism			7,561	9.6	7.9	7.5	8.3
	Drugs for peptic ulcer and gastro-oesophageal reflux		2,868	3.6	3.0	2.8	3.2
		Esomeprazole	1,121	1.4	1.2	1.1	1.3
		Pantoprazole	510	0.6	0.5	0.5	0.6
		Omeprazole	478	0.6	0.5	0.4	0.6
	Propulsives		612	0.8	0.6	0.6	0.7
		Metoclopramide	530	0.7	0.6	0.5	0.6
	Blood glucose lowering drugs, excl. insulins		2,035	2.6	2.1	1.9	2.3
		Metformin	1,134	1.4	1.2	1.1	1.3
		Gliclazide	512	0.7	0.5	0.5	0.6
Respiratory system			4,871	6.2	5.1	4.8	5.4
	Adrenergics, inhalants		2,515	3.2	2.6	2.4	2.8
		Salbutamol	1,241	1.6	1.3	1.2	1.4
		Salmeterol and other drugs for obstructive airways disease	775	1.0	0.8	0.7	0.9
	Other drugs for obstructive airways disease, inhalants		772	1.0	0.8	0.7	0.9
	Decongestants and other nasal preparations for topical use		731	0.9	0.8	0.7	0.8

(continued)

Table 9.1 (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 = 79,051)	Rate per 100 encs ^(a) (n = 95,898)	95% LCL	95% UCL
Musculoskeletal system			4,544	5.8	4.7	4.4	5.0
	Anti-inflammatory and antirheumatic products, non-steroid		3,315	4.2	3.5	3.2	3.7
		Meloxicam	899	1.1	0.9	0.8	1.1
		Diclofenac	743	0.9	0.8	0.7	0.9
	Drugs affecting bone structure and mineralization		620	0.8	0.7	0.6	0.7
Dermatologicals			3,740	4.7	3.9	3.7	4.1
	Corticosteroids, plain		2,322	2.9	2.4	2.3	2.6
		Mometasone	724	0.9	0.8	0.7	0.8
		Betamethasone	688	0.9	0.7	0.6	0.8
Genitourinary system and sex hormones			3,237	4.1	3.4	3.2	3.6
	Hormonal contraceptives for systemic use		1,664	2.1	1.7	1.6	1.9
		Levonorgestrel and estrogen	931	1.2	1.0	0.9	1.1
	Estrogens		596	0.8	0.6	0.6	0.7
Sensory organs			2,341	3.0	2.4	2.3	2.6
	Anti-infectives		967	1.2	1.0	0.9	1.1
		Chloramphenicol	896	1.1	0.9	0.9	1.0
	Corticosteroids and anti-infectives in combination		616	0.8	0.6	0.6	0.7
Blood and blood-forming organs			2,056	2.6	2.1	2.0	2.3
	Antithrombotic agents		1,475	1.9	1.5	1.4	1.7
		Warfarin	1,030	1.3	1.1	0.9	1.2
Systemic hormonal preparations, excl. sex hormones			1,827	2.3	1.9	1.8	2.1
	Corticosteroids for systemic use, plain		1,126	1.4	1.2	1.1	1.3
		Prednisolone	742	0.9	0.8	0.7	0.9
	Thyroid preparations		639	0.8	0.7	0.6	0.7
		Levothyroxine sodium	636	0.8	0.7	0.6	0.7
Antineoplastic and immunomodulating agents			355	0.5	0.4	0.3	0.4
Various			243	0.3	0.3	0.2	0.3
Antiparasitic products, insecticides and repellents			143	0.2	0.2	0.1	0.2
Total prescribed medications			79,051	100.0	82.4	80.3	84.6

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

Note: ATC—Anatomical Therapeutic Chemical classification; scripts—prescriptions; encs—encounters; LCL—lower confidence limit; UCL—upper confidence limit; excl—excluding; ACE—angiotensin converting enzyme.

Most frequently prescribed medications

The most frequently prescribed individual medications are reported at the CAPS generic level (ATC Level 5 equivalent) in Table 9.2. Together, these 30 medications accounted for 44.3% of all prescribed medications. Of the top five medications, two were antibiotics, two were plain or combination paracetamol, and the fifth was atorvastatin, a lipid-modifying agent, which was among the top five for the first time.

Readers interested in changes in antibiotic prescribing information over time will find more information in Pan et al. *Antibiotic prescribing in Australian general practice: How has it changed from 1990–91 to 2002–03?*⁵⁹

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

Generic medication	Number	Per cent of scripts (n = 79,051)	Rate per 100 encounters ^(a) (n = 95,898)	95% LCL	95% UCL
Amoxicillin	3,330	4.2	3.5	3.2	3.7
Paracetamol	2,381	3.0	2.5	2.2	2.7
Cephalexin	2,333	3.0	2.4	2.3	2.6
Paracetamol/Codeine	1,816	2.3	1.9	1.7	2.1
Atorvastatin	1,664	2.1	1.7	1.6	1.9
Amoxicillin/Potassium clavulanate	1,648	2.1	1.7	1.6	1.9
Salbutamol	1,283	1.6	1.3	1.2	1.5
Roxithromycin	1,174	1.5	1.2	1.1	1.4
Metformin	1,134	1.4	1.2	1.1	1.3
Perindopril	1,133	1.4	1.2	1.1	1.3
Esomeprazole	1,121	1.4	1.2	1.1	1.3
Diazepam	1,057	1.3	1.1	1.0	1.2
Temazepam	1,054	1.3	1.1	1.0	1.2
Warfarin sodium	1,030	1.3	1.1	0.9	1.2
Oxycodone	989	1.3	1.0	0.9	1.2
Levonorgestrel/Ethinylestradiol	931	1.2	1.0	0.9	1.1
Irbesartan	919	1.2	1.0	0.9	1.1
Meloxicam	899	1.1	0.9	0.8	1.1
Chloramphenicol eye	896	1.1	0.9	0.9	1.0
Simvastatin	879	1.1	0.9	0.8	1.0
Atenolol	835	1.1	0.9	0.8	1.0
Tramadol	817	1.0	0.9	0.8	0.9
Fluticasone/Salmeterol	775	1.0	0.8	0.7	0.9
Ramipril	772	1.0	0.8	0.7	0.9
Mometasone	724	0.9	0.8	0.7	0.8
Irbesartan/Hydrochlorothiazide	723	0.9	0.8	0.7	0.9
Doxycycline	702	0.9	0.7	0.7	0.8
Amlodipine	689	0.9	0.7	0.6	0.8

(continued)

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

Generic medication	Number	Per cent of scripts (n = 79,051)	Rate per 100 encounters ^(a) (n = 95,898)	95% LCL	95% UCL
Betamethasone topical	688	0.9	0.7	0.6	0.8
Diclofenac sodium systemic	659	0.8	0.7	0.6	0.8
<i>Subtotal</i>	<i>35,053</i>	<i>44.3</i>	<i>—</i>	<i>—</i>	<i>—</i>
Total prescribed medications	79,051	100.0	82.4	80.3	84.6

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

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

9.3 Medications supplied by GPs

GPs supplied their patients with 9,702 medications in this study, at a rate of 10.1 medications per 100 encounters. At least one medication was supplied at 7.9% of encounters for 5.3% of problems. Table 9.3 shows the most commonly supplied medications at the CAPS generic level (ATC Level 5 equivalent), with vaccines accounting for about 70% of this group. The Papillomavirus vaccine, which was government-funded for a GP-implemented catch-up program for women aged 18–26 years, was the second most commonly supplied medication.

Table 9.3: Medications most frequently supplied by GPs

Generic medication	Number	Per cent of GP-supplied (n = 9,702)	Rate per 100 encounters ^(a) (n = 95,898)	95% LCL	95% UCL
Influenza virus vaccine	1,403	14.5	1.5	1.2	1.7
Papillomavirus (HPV) vaccine	917	9.5	1.0	0.9	1.1
Pneumococcal vaccine	563	5.8	0.6	0.5	0.7
Vitamin B12 (Cobalamin)	350	3.6	0.4	0.3	0.4
Mumps/Measles/Rubella vaccine	299	3.1	0.3	0.3	0.4
<i>Haemophilus B</i> vaccine	255	2.6	0.3	0.2	0.3
Polio vaccine oral sabin/injection	216	2.2	0.2	0.2	0.3
ADT–CDT (diphtheria–tetanus) vaccine	202	2.1	0.2	0.2	0.3
Diphtheria–pertussis–tetanus–polio vaccine	180	1.9	0.2	0.1	0.2
Chickenpox (Varicella zoster)	169	1.8	0.2	0.1	0.2
Meningitis vaccine	168	1.7	0.2	0.1	0.2
Diphtheria–pertussis–tetanus–hepatitis B vaccine	164	1.7	0.2	0.1	0.2
Meloxicam	161	1.7	0.2	0.1	0.2
Diphtheria–pertussis–tetanus–hep B–polio–Hib vaccine	159	1.6	0.2	0.1	0.2
Rotavirus vaccine	139	1.4	0.1	0.1	0.2
Metoclopramide	124	1.3	0.1	0.1	0.2
Hepatitis B vaccine	116	1.2	0.1	0.1	0.2
Hepatitis A vaccine	112	1.2	0.1	0.1	0.2
Allergen treatment	102	1.1	0.1	0.1	0.1

(continued)

Table 9.3 (continued): Medications most frequently supplied by GPs

Generic medication	Number	Per cent of GP-supplied (n = 9,702)	Rate per 100 encounters ^(a) (n = 95,898)	95% LCL	95% UCL
Typhoid vaccine (<i>Salmonella typhi</i>)	101	1.0	0.1	0.1	0.1
Hepatitis A and B vaccine	90	0.9	0.1	0.1	0.1
<i>Haemophilus B</i> –hepatitis B vaccine	88	0.9	0.1	0.1	0.1
Methylprednisolone	85	0.9	0.1	0.1	0.1
Esomeprazole	83	0.9	0.1	0.1	0.1
Triple antigen (diphtheria–pertussis–tetanus)	80	0.8	0.1	0.1	0.1
Betamethasone systemic	78	0.8	0.1	0.1	0.1
Hepatitis A– <i>salmonella typhi</i> vaccine	76	0.8	0.1	0.1	0.1
Medroxyprogesterone	73	0.8	0.1	0.1	0.1
Lignocaine	64	0.7	0.1	0.0	0.1
Salbutamol	59	0.6	0.1	0.0	0.1
<i>Subtotal</i>	6,678	68.8	—	—	—
Total medications supplied	9,702	100.0	10.1	9.5	10.7

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

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

9.4 Medications advised for over-the-counter purchase

The GPs recorded 9,686 medications as recommended for OTC purchase, at rates of 10.1 per 100 encounters and 6.7 per 100 problems managed. At least one OTC medication was recorded as advised at 8.9% of encounters and for 6.1% of problems. Table 9.4 shows the top 30 advised medications at the CAPS generic level (ATC Level 5 equivalent). Analgesics made up almost one-third of this group.

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

Generic medication	Number	Per cent of OTC (n = 9,686)	Rate per 100 encounters ^(a) (n = 95,898)	95% LCL	95% UCL
Paracetamol	2,442	25.2	2.6	2.2	2.9
Ibuprofen	549	5.7	0.6	0.5	0.7
Loratadine	194	2.0	0.2	0.2	0.3
Diclofenac topical	179	1.9	0.2	0.1	0.2
Saline bath/solution/gargle	174	1.8	0.2	0.1	0.2
Sodium chloride topical nasal	161	1.7	0.2	0.1	0.2
Sodium–potassium–citric–glucose	155	1.6	0.2	0.1	0.2
Fexofenadine	138	1.4	0.1	0.1	0.2
Aspirin	134	1.4	0.1	0.1	0.2

(continued)

Table 9.4 (continued): Most frequently advised over-the-counter medications

Generic medication	Number	Per cent of OTC (n = 9,686)	Rate per 100 encounters^(a) (n = 95,898)	95% LCL	95% UCL
Cetirzine	123	1.3	0.1	0.1	0.2
Paracetamol–codeine	120	1.2	0.1	0.1	0.2
Clotrimazole topical	120	1.2	0.1	0.1	0.2
Cold and Flu medication NEC	112	1.2	0.1	0.0	0.2
Glucosamine	104	1.1	0.1	0.1	0.1
Hyoscine butylbromide	103	1.1	0.1	0.1	0.1
Hydrocortisone/Clotrimazole	100	1.0	0.1	0.1	0.1
Brompheniramine–phenylephrine	99	1.0	0.1	0.1	0.1
Cream–ointment–lotion NEC	97	1.0	0.1	0.1	0.1
Codeine–paracetamol–pseudoephedrine	94	1.0	0.1	0.0	0.2
Sorbolene–glycerol–cetomac	91	0.9	0.1	0.1	0.1
Bromhexine	82	0.9	0.1	0.0	0.1
Vitamin C (ascorbic acid)	81	0.8	0.1	0.0	0.2
Simple analgesics	80	0.8	0.1	0.0	0.1
Clotrimazole vaginal	78	0.8	0.1	0.1	0.1
Psyllium hydrophillic mucilloid	72	0.8	0.1	0.1	0.1
Chlorpheniramine–pseudoephedrine	70	0.7	0.1	0.0	0.1
Multivitamins with minerals	69	0.7	0.1	0.0	0.1
Promethazine hydrochloride	67	0.7	0.1	0.1	0.1
Pholcodine	66	0.7	0.1	0.0	0.1
Loperamide	66	0.7	0.1	0.0	0.1
<i>Subtotal</i>	<i>6,021</i>	<i>62.2</i>	—	—	—
Total medications advised	9,686	100.0	10.1	9.3	10.9

(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: OTC—over-the-counter medication; LCL—lower confidence limit; UCL—upper confidence limit; NEC—not elsewhere classified.