11 Referrals and admissions

A referral is defined as the process by which the responsibility for part or all of the care of a patient is temporarily transferred to another health care provider. Only new referrals arising at the encounter were included (i.e. continuations were not recorded). For each problem managed, GPs could record up to two referrals. These included referrals to specialists, to allied health professionals, to hospitals for admission or to the accident and emergency department. Referrals to hospital outpatient clinics were classified as specialist referrals. Referrals for certain clinical assessments such as endoscopies and ECGs without nomination of the provider, were also included in this section. (Note that orders for imaging and pathology are described in Section 12 Investigations.)

11.1 Number of referrals and admissions

The patient was given at least one referral at 10.4% of all encounters for 7.1% of all problems managed. There were 11,760 referrals made at a rate of 11.2 per 100 encounters. The most frequent were referrals to a medical specialist (7.3 per 100 encounters), followed by referrals to allied health services (3.1). Very few patients were referred to hospital for admission (0.7 per 100 encounters) or to the emergency department of a hospital (0.1 per 100). For every 100 problems managed, a referral to a specialist was made for 5.0, while a referral to an allied health professional was given for 2.1 (Table 11.1). A very small number of encounters (0.8%) resulted in two referrals.

Table 11.1: Referrals and admissions—summary table

	Number	Rate per 100 encs[(a)]	95% LCI	95% UCI	Rate per 100 problems[(a)]	95% LCI	95% UCI
At least one referral	10,922	10.4	10.0	10.8	7.1	6.8	7.3
Referrals	11,760	11.2	10.8	11.7	7.6	7.4	7.9
Specialist	7,639	7.3	7.0	7.6	5.0	4.8	5.2
Allied health service	3,290	3.1	2.9	3.4	2.1	2.0	2.3
Hospital	745	0.7	0.5	0.9	0.5	0.4	0.6
Emergency department	87	0.1	0.0	0.4	0.1	0.0	0.4

(a) Figures do not total 100.0 as more than one treatment can be described at each encounter and for each problem.
Note: Encs–encounters, UCI–upper confidence interval, LCI–lower confidence interval.

11.2 Most frequent referrals

Of the 11,760 referrals, 93% (n=10,929) were referrals to specialists or allied health services. The top ten provider types in each category accounted for 67.1% of all referrals to medical specialists and 61.5% of those to allied health services respectively (Table 11.2.)

Table 11.2: The most frequent referrals to specialists and allied health professionals

Professional to whom patient referred	Number	% of all referrals	% of referral group	Rate per 100 encs [(a)] (N=104,856)	95% LCI	95% UCI
Medical specialist	**7,639**	**69.9**	**100.0**	**7.3**	**7.0**	**7.6**
Surgeon	808	6.9	10.6	0.8	0.6	0.9
Orthopaedic surgeon	699	6.0	9.2	0.7	0.5	0.8
Ophthalmologist	689	5.9	9.0	0.7	0.5	0.8
Dermatologist	599	5.1	7.8	0.6	0.4	0.7
Gynaecologist	566	4.8	7.4	0.5	0.4	0.7
Ear, nose and throat specialist	503	4.3	6.6	0.5	0.3	0.6
Cardiologist	410	3.5	5.4	0.4	0.2	0.6
Gastroenterologist	350	3.0	4.6	0.3	0.1	0.5
Urologist	249	2.1	3.3	0.2	0.1	0.4
Psychiatrist	249	2.1	3.3	0.2	0.1	0.4
Subtotal: top ten specialist referrals	*5,122*	*43.6*	*67.1*	. .	. .	. .
Allied health professionals	**3,290**	**30.1**	**100.0**	**3.1**	**2.9**	**3.4**
Physiotherapy	1,097	9.3	33.3	1.1	0.8	1.3
Dentist	176	1.5	5.3	0.2	0.0	0.4
Psychologist	156	1.3	4.7	0.2	0.0	0.4
Podiatrist/chiropodist	140	1.2	4.3	0.1	0.0	0.3
Dietitian/nutrition	129	1.1	3.9	0.1	0.0	0.5
Acoustic testing	100	0.9	3.0	0.1	0.0	0.4
Optometrist	73	0.6	2.2	0.1	0.0	0.4
Drug & alcohol	65	0.6	2.0	0.1	0.0	0.7
Counsellor	51	0.4	1.6	0.1	0.0	0.4
Chiropractor	38	0.3	1.2	0.0	0.0	0.6
Subtotal: top ten allied health services	*2,025*	*17.2*	*61.5*	. .	. .	. .
Total specialist & allied health referrals	**10,929**	**100.0**	. .	**10.4**	. .	. .

(a) Figures do not total 100.0 as more than one referral can be described at each encounter.
Note: Encs–encounters, UCI–upper confidence interval, LCI–lower confidence interval.

The most frequent referrals made to specialist medical practitioners were to surgeons (10.6% of all referrals to medical specialists), orthopaedic surgeons (9.2%), ophthalmologists (9.0%) and dermatologists (7.8%).

The majority of referrals to allied health services were to physiotherapists, and these accounted for 33.3% of all referrals of this type, and 9.3% of all referrals. Referrals to dentists (1.5% of all referrals), psychologists (1.3%), podiatrists and chiropodists (1.2%) followed (Table 11.2).

11.3 Problems that were referred

A referral to a specialist was provided for a total of 7,639 problems managed. The ten problems most commonly associated with a referral to a specialist accounted for 17.0% of all problems associated with specialist referrals. The problems most often referred to a specialist were malignant neoplasms of the skin (2.4% of referred problems), osteoarthritis (1.9%), ischaemic heart disease (1.8%), depression (1.8%) and back complaints (1.8%) (Table 11.3).

Referrals to allied health services were fewer in number (3,290), possibly because formal referrals to such services are not always required. There were 3,201 problems referred to an allied health professional or service. Table 11.4 shows the ten most common of these. They accounted for one-third (33.7%) of all problems referred to allied health services.

Back complaint was the problem type most frequently referred to allied health services (8.4% of problems referred), followed by sprains and strains (6.0%). These problems are those that would be likely to be referred to physiotherapists. Depression (3.1%), teeth/gum disease (2.9%) and osteoarthritis (2.7%) also featured in the top ten problems referred to allied health services. Note that depression, ischaemic heart disease, back complaints, osteoarthritis and diabetes were referred relatively frequently to both allied health professionals and to medical specialists.

Of the 745 referrals for hospital admission, the problems under management were often acute in nature. While the numbers involved are very small it is interesting to note the types of problems for which hospital admission was sought. These included fractures (6.0% of problems referred for admission), appendicitis (3.2%) and pneumonia (2.2%). Cardiovascular problems such as heart failure, ischaemic heart disease and acute myocardial infarctions were also referred to hospital. Referrals to psychiatric units/hospitals were also included in this category and these would appear to be associated with depression (1.9%) (Table 11.5).

Table 11.3: The ten most common problems referred to a specialist

Problem managed	Number	% of problems referred	Rate per 100 encs [(a)] (N=104,856)	95% LCI	95% UCI
Malignant neoplasm skin	182	2.4	0.2	0.0	0.4
Osteoarthritis*	145	1.9	0.1	0.0	0.4
Ischaemic heart disease*	141	1.8	0.1	0.0	0.4
Depression*	138	1.8	0.1	0.0	0.4
Back complaint*	138	1.8	0.1	0.0	0.4
Diabetes (all)*	128	1.7	0.1	0.0	0.4
Pregnancy*	124	1.6	0.1	0.0	0.4
Oesophageal disease	115	1.5	0.1	0.0	0.3
Acute internal knee damage	94	1.2	0.1	0.0	0.3
Menstrual problems*	94	1.2	0.1	0.0	0.3
Subtotal: top ten problems referred to a specialist	*1,299*	*17.0*	*. .*	*. .*	*. .*
Total problems	**7,639**	**100.0**	**7.2**	**6.9**	**7.5**

(a) Figures do not total 100.0 as more than one RFE can be described at each encounter.
* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).
Note: Encs–encounters, UCI–upper confidence interval, LCI–lower confidence interval.

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

Problem managed	Number	% of problems referred	Rate per 100 encs [(a)] (N=104,856)	95% LCI	95% UCI
Back complaint*	269	8.4	0.2	0.1	0.5
Sprain/strain*	193	6.0	0.2	0.0	0.4
Depression*	99	3.1	0.1	0.0	0.4
Teeth/gum disease	93	2.9	0.1	0.0	0.4
Osteoarthritis*	87	2.7	0.1	0.0	0.4
Neck syndrome (incl. osteoarthritis)	79	2.5	0.1	0.0	0.4
Injury musculoskeletal NOS	73	2.3	0.1	0.0	0.4
Ischaemic heart disease*	67	2.1	0.1	0.0	0.4
Diabetes (all)*	62	2.0	0.1	0.0	0.5
Shoulder syndrome (incl. arthritis)	56	1.8	0.1	0.0	0.4
Subtotal: top ten problems referred to an allied health professional	*1,078*	*33.7*	*. .*	*. .*	*. .*
Total problems	**3,201**	**100.0**	**3.1**	**2.8**	**3.3**

(a) Figures do not total 100.0 as more than one RFE can be described at each encounter.
* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).
Note: Encs–encounters, UCI–upper confidence interval, LCI–lower confidence interval, NOS–not otherwise specified

Table 11.5: The ten most common problems referred to hospital

Problem managed	Number	% of problems managed	Rate per 100 encs [(a)] (N=104,856)	95% LCI	95% UCI
Fracture*	45	6.0	0.04	0.0	0.4
Heart failure*	26	3.5	0.03	0.0	0.6
Ischaemic heart disease*	24	3.2	0.02	0.0	0.6
Appendicitis	24	3.2	0.02	0.0	0.5
Pneumonia	17	2.2	0.02	0.0	0.6
Asthma	14	1.9	0.01	0.0	0.6
Chronic obstructive pulmonary disease	14	1.9	0.01	0.0	0.6
Depression*	14	1.9	0.01	0.0	0.8
Pre-postnatal check-up*	13	1.7	0.01	0.0	0.8
Acute myocardial infarction	12	1.7	0.01	0.0	0.7
Subtotal: top ten problems referred to a hospital	*203*	*27.2*	*. .*	*. .*	*. .*
Total problems	**745**	**100.0**	**0.71**	**0.6**	**0.9**

(a) Figures do not total 100.0 as more than one RFE can be described at each encounter.
* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).
Note: Encs–encounters, UCI–U=upper confidence interval, LCI–lower confidence interval.

11.4 The inter-relationship of referrals with other variables. Example: referrals to a surgeon

Referrals can be directly linked (solid lines in Figure 11.1) to all other encounter variables apart from RFEs (shown as dotted lines). There were 808 problems referred to surgeons and these accounted for 10.6% of referrals to medical specialists.

Age and sex distribution of patients

Over half the patients referred to a surgeon were female (51.9%) but this proportion was somewhat less than in the total dataset (57.3% female). Patients aged 25–44 years were over-represented in this subgroup (31.4% compared with approximately 25% in the total dataset), and those aged less than 25 years were under-represented (12.6%).

Reasons for encounter

Patients who were referred to a surgeon presented to the GP with a range of RFEs including a request for test results (9.5 per 100 encounters at which there was a surgeon referral), swelling (9.3) and abdominal pain (9.2). A request for a prescription was made at a rate of 6.0 per 100 encounters.

Problems managed

Of the most common problems referred to a surgeon there were a number of digestive problems managed, the most common being inguinal hernias (6.8 per 100 problems referred to a surgeon), together with other abdominal hernias (6.2), and cholecystitis / cholelithiasis (4.7). Other problems managed included malignant skin neoplasms (6.5) and haemorrhoids (4.6 per 100).

Prescriptions and other treatments

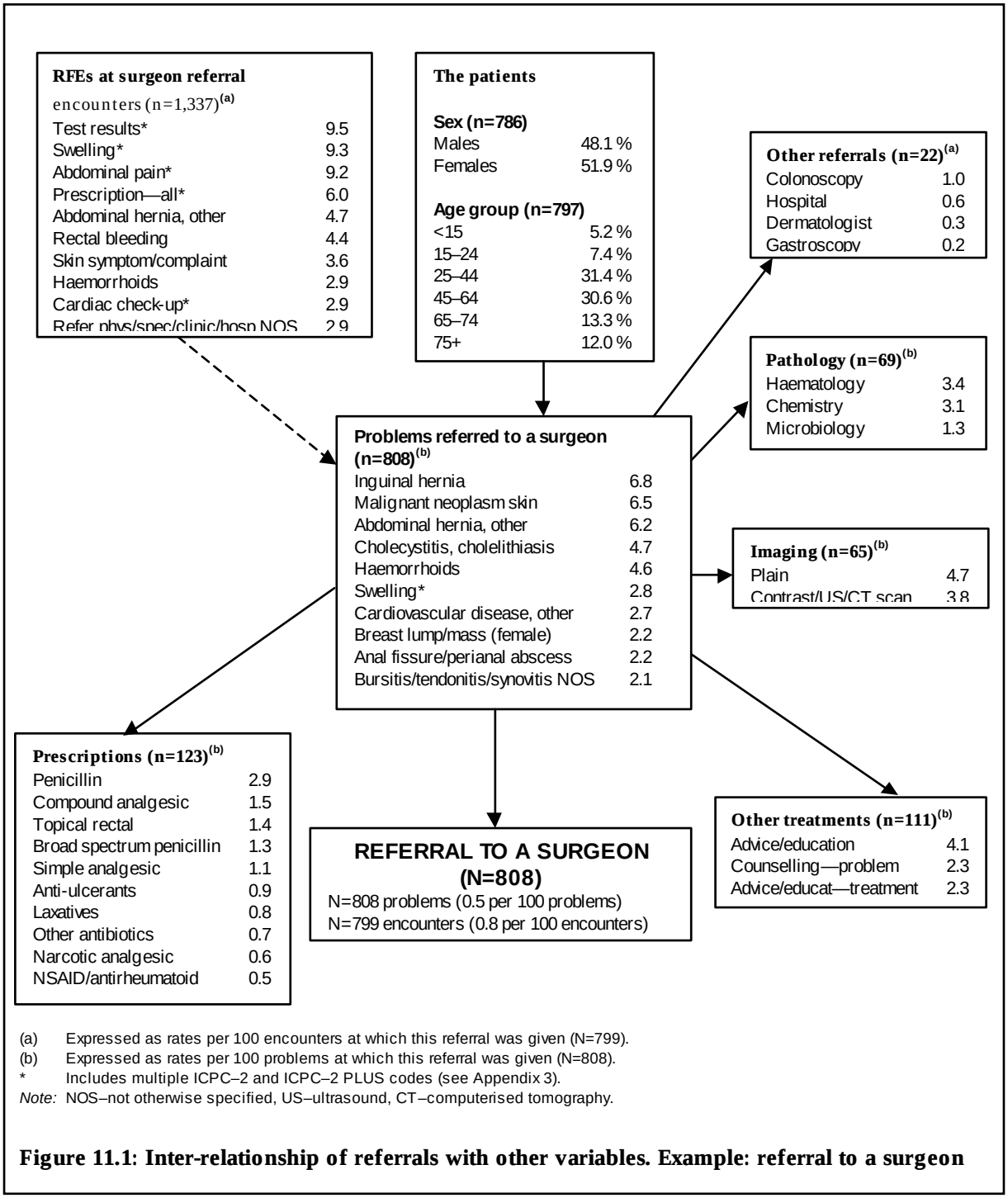
The prescription rate for these problems was notably less (15.2 per 100 problems) than the average for all problems (75.0). This suggests that GPs are less likely to prescribe pharmacological treatment for patients they are referring to a surgeon.

The majority of medications prescribed for problems referred to a surgeon were analgesics and anti-infectives. The most common prescription was for penicillin (2.9 per 100 problems) followed by compound analgesics (1.5) and topical rectal medication (1.4).

The rate of non-pharmacological treatments was also less (13.7 per 100 problems) than in the total dataset (31.3). The most common of these were general advice / education (4.1 per 100 problems referred to a surgeon), counselling about the problem being referred (2.3) and advice / education about treatment of the problem (2.3).

Other referrals, tests and investigations

There were few other referrals (22) made for the problems referred to a surgeon and ordering rates for pathology and imaging were also relatively low. Haematology (3.4 per 100 problems) and chemistry (3.1) were the most frequent pathology test types ordered for problems where a referral to a surgeon was made.



(a) Expressed as rates per 100 encounters at which this referral was given (N=799).
(b) Expressed as rates per 100 problems at which this referral was given (N=808).
* Includes multiple ICPC–2 and ICPC–2 PLUS codes (see Appendix 3).
Note: NOS–not otherwise specified, US–ultrasound, CT–computerised tomography.

Figure 11.1: Inter-relationship of referrals with other variables. Example: referral to a surgeon

12 Investigations

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

A pathology test order may be for a single test (e.g. Pap smear, HbA1c) or for a battery of tests (e.g. lipids, FBC). Where a battery of tests was ordered the battery name was recorded rather than each individual test. GPs also recorded the body site for any imaging ordered (e.g. x-ray chest, CT head).

There were no tests recorded at the vast majority (81.1%) of encounters. At least one pathology order was recorded at 13.8% of encounters (for 10.4% of problems managed) and at least one imaging test was ordered at 6.7% of encounters (for 4.7% of problems managed) (Table 12.1).

Table 12.1: Number of encounters and problems generating an order for a pathology or imaging test

	Number of encs	% of encs	95% LCI	95% UCI	Number of probs	% of probs	95% LCI	95% UCI
Pathology and imaging ordered	1,591	1.5	1.4	1.7	1,213	0.8	0.7	0.9
Pathology only ordered	12,835	12.2	11.8	12.7	14,727	9.6	9.2	9.9
Imaging only ordered	5,428	5.2	4.9	5.4	6,029	3.9	3.7	4.1
No tests ordered	85,002	81.1	80.5	81.7	131,889	85.7	85.3	86.2
Total (N)	**104,856**	**100.0**	**..**	**..**	**153,857**	**100.0**	**..**	**..**
At least one pathology ordered	14,426	13.8	13.3	14.3	15,940	10.4	10.0	10.7
At least one imaging ordered	7,019	6.7	6.4	7.0	7,242	4.7	4.5	4.9

Note: Abbreviations: Encs–encounters, Probs–problems, UCI–Upper confidence interval, LCI–Lower confidence interval.

12.1 Pathology ordering

A comprehensive report on pathology ordering by general practitioners in Australia in 1998 written by the GP Statistics and Classification Unit using BEACH data were published on the Internet by the Diagnostics and Technology Branch of the DHAC during 2000 (Britt et al. 1999a). Readers wishing a more detailed study of pathology ordering should consult that publication and may wish to compare those results with the information presented below.

12.1.1 Number of pathology orders at encounter

There were 27,613 orders for a pathology test (or battery of tests) and these were made at a rate of 26.3 per 100 encounters (Table 12.2).

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

Pathology test ordered	Number	% of all pathology orders	Per cent of group	Rate per 100 encs (N=104,700)	95% LCI	95% UCI
Chemistry	**12,711**	**46.0**	**100.0**	**12.1**	**11.4**	**12.8**
Lipids	2,413	8.7	19.0	2.3	2.1	2.5
EUC	1,656	6.0	13.0	1.6	1.3	1.9
Liver function	1,607	5.8	12.6	1.5	1.3	1.8
Glucose/tolerance	1,434	5.2	11.3	1.4	1.2	1.6
Thyroid function	1,283	4.6	10.1	1.2	1.1	1.4
Multibiochemical analysis	1,159	4.2	9.1	1.1	0.7	1.5
Hormone assay	581	2.1	4.6	0.6	0.3	0.8
Ferritin	534	1.9	4.2	0.5	0.3	0.7
HbA1c	483	1.8	3.8	0.5	0.3	0.7
Prostate-specific antigen	410	1.5	3.2	0.4	0.2	0.6
Haematology	**5,342**	**19.4**	**100.0**	**5.1**	**4.8**	**5.4**
Full blood count	3,525	12.8	66.0	3.4	3.1	3.6
ESR	836	3.0	15.7	0.8	0.6	1.0
Coagulation	737	2.7	13.8	0.7	0.5	0.9
Microbiology	**4,795**	**17.4**	**100.0**	**4.6**	**4.3**	**4.9**
Urine MC&S	1,674	6.1	34.9	1.6	1.5	1.7
Hepatitis serology	546	2.0	11.4	0.5	0.2	0.8
Vaginal swab and C&S	373	1.4	7.8	0.4	0.1	0.6
Microbiology, other	286	1.0	6.0	0.3	0.1	0.5
HIV	272	1.0	5.7	0.3	0.0	0.5
Faeces MC&S	221	0.8	4.6	0.2	0.0	0.4
Monospot	220	0.8	4.6	0.2	0.0	0.5
Cytology	**1,594**	**5.8**	**100.0**	**1.5**	**1.3**	**1.8**
Pap smear	1,546	5.6	97.0	1.5	1.2	1.7
Other NEC	**1,657**	**6.0**	**100.0**	**1.6**	**1.2**	**2.0**
Other NEC, other	956	3.5	57.7	0.9	0.4	1.4
Other NEC, blood test	369	1.3	22.3	0.4	0.0	0.8
Infertility/pregnancy	**412**	**1.5**	**100.0**	**0.4**	**0.2**	**0.6**
Histopathology	**524**	**1.9**	**100.0**	**0.5**	**0.3**	**0.7**
Histology, skin	422	1.5	80.5	0.4	0.2	0.6
Immunology	**538**	**2.0**	**100.0**	**0.5**	**0.2**	**0.8**
Immunology, other	269	1.0	50.0	0.3	0.0	0.7
Simple test, other	**39**	**0.1**	**100.0**	**0.0**	**0.0**	**0.7**
Total pathology tests	**27,613**	**100.0**	**100.0**	**26.3**	**25.2**	**27.5**

Note: Encs–encounters, UCI–upper confidence interval, LCI–lower confidence interval

12.1.2 Nature of the pathology orders

Table 12.2 provides a summary of the different types of pathology tests that were ordered by the participating GPs.

The pathology tests recorded were grouped according to the categories set out in Appendix 7. The ten main pathology groups reflect those used in previous analyses of pathology tests recorded by the HIC.

The top four pathology test groups were Chemistry, Haematology, Microbiology and Cytology and together these accounted for almost 90% of all pathology test orders. The fifth largest group was Other NEC (other pathology test orders that could not be classified elsewhere), which made up 6.0% of all pathology test orders. The relatively large size of this group is in part due to the non-specificity of the pathology orders sometimes recorded by some GPs (e.g. blood test) and in part to a lack of specificity available in ICPC–2 PLUS for the classification of some pathology items.

The largest of the groups, Chemistry, accounted for 46.0% of all tests and was recorded at a rate of 12.1 per 100 encounters. Within this group the most frequently ordered test was lipids (19.0%) followed by EUC (13.0%). Full blood count (66.0%) was the largest group within Haematology and urine MC&S (34.9%) was the largest in Microbiology.

The most frequently ordered test types were full blood count, lipids, urine MC&S, EUC, liver function and Pap smear tests. Full blood counts accounted for 12.8% of tests and were ordered at a rate of 3.4 per 100 encounters. Pap smears, accounting for 6.6% of all tests, made up the greater proportion of the Cytology group (97.0%). Lipid tests were ordered at a rate of 2.3 per 100 encounters (Table 12.2).

12.1.3 Problems associated with pathology tests

Table 12.3 describes, in decreasing order of frequency, the most common problems under management when pathology was ordered. They are presented in decreasing order of frequency.

There were 15,940 problems to which pathology tests were linked (Table 12.1). The three problems accounting for the highest number of pathology tests ordered were lipid disorder (5.3% of problems managed with a pathology order), hypertension (4.9%), female genital check-up / Pap smear (4.5%) and diabetes (4.4%). This is not surprising given the distribution of pathology tests described in the previous table. However, the last two columns of the table provide some interesting contrasts. The second last column shows the per cent of contacts (with the selected problem) that resulted in an order for pathology. The last column shows the number of test orders placed when contact with the selected problem resulted in pathology tests.

Hypertension was the most common problem managed in general practice and there were 8,821 hypertension problems recorded in the dataset (5.7% of problems). Female genital check-ups (1.1% of problems) occurred far less frequently. However, female genital check-ups accounted for almost as many pathology tests as did hypertension. There were 1,285 tests orders (4.5%) associated with female genital check-up and 1,391 test orders (4.9%) associated with hypertension. This is explained by the fact that 71.6% of female genital check-ups resulted in a pathology test compared with 7.5% of contacts with hypertension.

Weakness / tiredness was not a problem label that ranked in the top thirty problems managed in general practice, yet it ranked fifth highest in the problems associated with pathology ordering. This is because the decision to order a pathology test for

weakness / tiredness was relatively frequent (50.5% of contacts generating an order) and where such a decision was made, multiple pathology tests were likely (averaging 318 test orders per 100 problems). The problem label of female genital check-up / Pap smear, and the associated pathology test Pap smear, provide a useful contrast as multiple tests were rarely ordered.

Table 12.3: The ten most common problems for which a pathology test ordered

Problem managed	Number of problems	Number of prob/path combinations[(a)]	% of prob/path combinations	Per cent of problems with test[(b)]	Rate of path orders per 100 problems with path[(c)]
Lipid disorder	2,765	1,512	5.3	31.1	175.7
Hypertension*	8,821	1,391	4.9	7.5	211.6
Female genital check-up/Pap smear*	1,628	1,285	4.5	71.6	110.3
Diabetes (all)*	2,808	1,236	4.4	23.1	190.9
Weakness/tiredness general	704	1,130	4.0	50.5	318.0
UTI*	1,843	1,029	3.6	50.9	109.6
General check-up*	1,845	875	3.1	21.2	224.3
Pre-postnatal check-up*	1,189	555	2.0	24.6	190.1
Pregnancy*	777	410	1.5	32.3	163.3
Viral disease, other/NOS	1,608	398	1.4	10.0	248.6
Subtotal	*23,988*	*9,822*	*34.6*	*. .*	*. .*
Total	**153,857**	**28,356**	**100.0**	**. .**	**. .**

(a) A test was counted more than once if it was ordered for the management of more than one problem at an encounter. There were 27,613 pathology test orders and 28,356 problem/pathology combinations.
(b) The per cent of contacts with the problem which generated at least one order for pathology.
(c) The rate of pathology orders placed per 100 contacts with that problem generating at least one order for pathology.
* Includes multiple ICPC-2 and ICPC-2 PLUS codes (see Appendix 3).
Note: Path—pathology order, prob—problem managed.

12.1.4 The inter-relationship between pathology ordered and other variables. Example: thyroid function test

Thyroid function test was the eighth most common pathology test ordered in general practice, accounting for 4.6% of all pathology orders. Overall 1,283 thyroid function tests were ordered at a rate of 1.2 per 100 encounters (Table 12.2).

Figure 12.1 illustrates the relationship between the ordering of a thyroid function test and other variables that are collected at the general practice encounter. An order for pathology is directly linked to one or more problems under management. Through these managed problems, the pathology order can be linked to the other variables collected at the encounter such as medications supplied and imaging ordered.

Age and sex distribution of patients

Eighty per cent of patients for whom a thyroid function test was ordered were female, and this is much higher than the proportion for the dataset as a whole. There were relatively few patients aged under 25 who had a thyroid function test compared with the dataset patient population.

Reasons for encounter

There were 2,360 reasons for encounter recorded at the 1,283 encounters at which a thyroid function test was ordered. The most common reasons for encounter for patients with a thyroid function test were weakness / tiredness (24.4 per 100 encounters), a request for a prescription (8.8), general check-up (5.6) and cardiac check-up (5.5).

Problems managed

There were 1,322 problems associated with an order for a thyroid function test. Weakness / tiredness was the most common of these problems followed by hypothyroidism and hyperthyroidism.

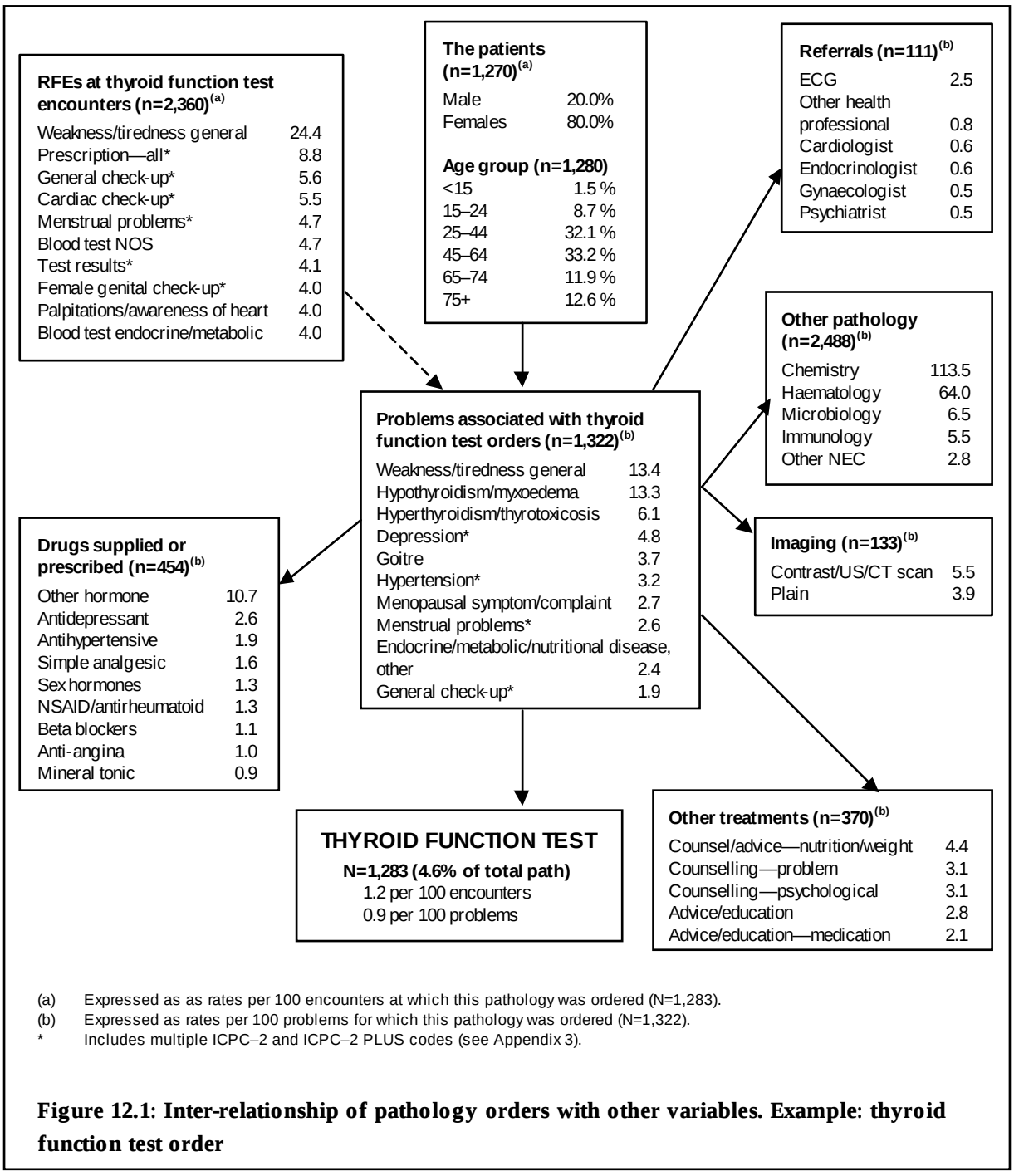
Prescriptions and other treatments

Medications supplied or prescribed for problems managed with an order for a thyroid function test numbered 454. The most common medication groups were 'other hormones' (which includes thyroxine) (10.7 per 100 problems managed) and antidepressants (2.6).

Other treatments were carried out for problems managed with a thyroid function test at a rate of 28.0 per 100 problems. The majority of these other treatments were in the form of advice or counselling.

Referrals, tests and investigations

A referral for an ECG was the most common referral for problems associated with a thyroid function test. An order for imaging was recorded at 10.0 of every 100 problems managed by a thyroid function test. The contrast / ultrasound / CT group of x-rays were the most common type of imaging ordered. Almost 200 other pathology tests were ordered for every 100 problems managed with an order for a thyroid function test. Pathology tests categorised as Chemistry made up over 60% of these tests.



(a) Expressed as as rates per 100 encounters at which this pathology was ordered (N=1,283).
(b) Expressed as rates per 100 problems for which this pathology was ordered (N=1,322).
* Includes multiple ICPC–2 and ICPC–2 PLUS codes (see Appendix 3).

Figure 12.1: Inter-relationship of pathology orders with other variables. Example: thyroid function test order

12.2 Imaging ordering

12.2.1 Number of imaging orders at encounter

There were 7,841 orders for imaging and these were made at a rate of 7.5 per 100 encounters (Table 12.4). At least one imaging was ordered at 6.7% of encounters and for 4.7% of problems managed (Table 12.1).

12.2.2 Nature of imaging orders

The imaging tests recorded were grouped into one of three categories–Plain, Contrast / US / CT and Other imaging (see Appendix 7). Plain x-rays made up almost two-thirds (59.1%) of all imaging tests, Contrast / US / CT accounted for 34.7% and Other imaging only 6.2% (Table 12.4).

Chest x-rays were by far the most common plain x-ray (23.0%) while x-ray of the knee (8.6%) and x-ray of spine (8.0%) followed. Contrast x-rays were usually of the abdomen (16.0%), the pelvis (13.3%) or spine (7.7%). Bone scans (32.2%), doppler tests (21.7%) and unspecified imaging (21.2%) were the most common in the other group (Table 12.4).

Overall the most frequently ordered imaging test was a chest x-ray which accounted for 13.6% of all imaging and was ordered at a rate of 1.0 per 100 encounters. All other imaging tests were ordered at a rate of less than 1 per 100 encounters. Contrast x-rays of the abdomen, the second most frequently ordered, accounted for 5.5% of all imaging tests and were ordered at a rate of 0.4 per 100 encounters.

12.2.3 Problems associated with orders for imaging

Table 12.5 describes the problems most commonly under management when imaging was ordered. They are presented in decreasing order of frequency.

There were 7,918 problem / imaging combinations. Six (including the top four) of the ten most common problems were related to the musculoskeletal system. The remaining problems were related to abdominal, breast, skin and respiratory problems.

Back complaint, the most common problem for which imaging was ordered, accounted for 6.4% of all imaging. Only 15.3% of contacts with this problem resulted in an order for imaging. Fracture accounted for almost the same proportion of imaging orders but over one-third (37.9%) of contacts with a fracture resulted in an imaging order.

The ordering of multiple imaging for a single problem was much less common than the ordering of multiple pathology. Breast lump / mass (female) had the highest rate of multiple test orders in the top ten problems, 137.2 tests being ordered for every 100 problems.

Table 12.4: Most frequent imaging tests ordered

Imaging test ordered	Number	Per cent of tests	Per cent of group	Rate per 100 encs	95% LCI	95% UCI
Plain	**4,634**	**59.1**	**100.0**	**4.4**	**4.2**	**4.7**
X-ray;chest	1,063	13.6	23.0	1.0	0.9	1.1
X-ray;knee	397	5.1	8.6	0.4	0.2	0.5
X-ray;spinal	371	4.7	8.0	0.4	0.2	0.5
Mammography;F	360	4.6	7.8	0.3	0.2	0.5
X-ray;foot/feet	276	3.5	6.0	0.3	0.1	0.4
X-ray;lumbosacral	272	3.5	5.9	0.3	0.0	0.5
X-ray;hand	238	3.0	5.1	0.2	0.1	0.4
X-ray;shoulder	225	2.9	4.9	0.2	0.0	0.4
X-ray;ankle	215	2.7	4.6	0.2	0.0	0.4
X-ray;hip	170	2.2	3.7	0.2	0.0	0.4
X-ray;wrist	163	2.1	3.5	0.2	0.0	0.3
X-ray;abdomen	106	1.4	2.3	0.1	0.0	0.4
X-ray;cervical	102	1.3	2.2	0.1	0.0	0.4
X-ray;neck	90	1.2	2.0	0.1	0.0	0.5
X-ray;elbow	79	1.0	1.7	0.1	0.0	0.3
Contrast / US / CT	**2,718**	**34.7**	**100.0**	**2.6**	**2.4**	**2.8**
Test;US/CT/contrast;abdomen	434	5.5	16.0	0.4	0.3	0.6
Test;US/CT/contrast;pelvis	362	4.6	13.3	0.4	0.2	0.5
Test;US/CT/contrast;spine	209	2.7	7.7	0.2	0.0	0.4
Test;US/CT/contrast;obstetric	184	2.3	6.8	0.2	0.0	0.5
Test;US/CT/contrast;breast;F	172	2.2	6.3	0.2	0.0	0.4
Test;US/CT/contrast;shoulder	158	2.0	5.8	0.2	0.0	0.4
Test;US/CT/contrast;brain	134	1.7	5.0	0.1	0.0	0.4
Test;US/CT/contrast;urin tract	131	1.7	4.8	0.1	0.0	0.4
Test;US/CT/contrast	130	1.7	4.8	0.1	0.0	0.4
Test;US/CT/contrast;head	102	1.3	3.7	0.1	0.0	0.4
Test;US/CT/contrast;neck	77	1.0	2.9	0.1	0.0	0.4
Other	**488**	**6.2**	**100.0**	**0.5**	**0.2**	**0.7**
Scan;bone(s)	157	2.0	32.2	0.2	0.0	0.5
Test;Doppler	106	1.4	21.7	0.1	0.0	0.4
Imaging other	103	1.3	21.2	0.1	0.0	1.4
Total imaging tests	**7,841**	**100.0**	**100.0**	**7.5**	**7.1**	**7.8**

Note: Abbreviations: Encs–encounters, UCI–Upper confidence interval, LCI–Lower confidence interval.

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

Problem managed	Number of problems	Number of prob/imaging combinations[a]	Per cent of prob/imaging combinations	Per cent of problems with test[b]	Rate of image orders per 100 problems with imaging[c]
Back complaint*	2,880	506	6.4	15.3	114.8
Fracture*	1,032	423	5.3	37.9	108.1
Osteoarthritis*	2,346	325	4.1	12.6	109.6
Sprain/Strain*	1,878	318	4.0	16.0	105.8
Injury musculoskeletal NOS	745	200	2.5	24.5	109.4
Abdominal pain*	620	191	2.4	27.7	111.1
Shoulder syndrome (incl arthritis)	504	160	2.0	25.1	126.6
Injury skin, other	629	157	2.0	23.5	106.1
Breast lump/mass (female)	178	154	1.9	62.8	137.2
Acute bronchitis/bronchiolitis	3,319	146	1.8	4.4	100.5
Subtotal	*14,131*	*2,579*	*32.6*	*. .*	*. .*
Total	**153,857**	**7,918**	**100.0**	**. .**	**. .**

(a) A test was counted more than once if it was ordered for the management of more than one problem at an encounter. There were 7,841 imaging test orders and 7,918 problem/imaging combinations.
(b) The per centage of contacts with the problem which generated at least one order for imaging.
(c) The rate of imaging orders placed per 100 contacts with that problem generating at least one order for imaging.
* Includes multiple ICPC–2 and ICPC–2 PLUS codes (see Appendix 3).
Note: Prob—problem, image—imaging

12.2.4 The inter-relationship between imaging ordered and other variables. Example: plain spinal x-ray

Figure 12.2 illustrates the relationship between the ordering of a plain spinal x-ray and other variables that are collected at the general practice encounter. The 775 orders accounted for 4.7% of all imaging and occurred at a rate of 0.4 per 100 encounters. An order for imaging is directly linked to one or more problems under management. Through these problems managed, the imaging can be linked to other variables such as referrals and treatments carried out.

Age and sex distribution of patients

Just under half of the patients who had a spinal x-ray were male, and this is slightly higher than the overall per centage of males seen in general practice. Patients aged 45–64 were also over-represented.

Reasons for encounter

There were 1,274 reasons for encounter recorded at encounters where a spinal x-ray was ordered. Back and neck complaints were the most common RFEs recorded.

Problems managed

Back complaint was the most common problem managed of the 775 problems managed with a spinal x-ray accounting for almost 40% of tests.

Prescriptions and other treatments

There were 558 medications prescribed or supplied for problems with a spinal x-ray. The most common were NSAIDs (31.7) followed by compound analgesics (16.0) and simple analgesics (13.9).

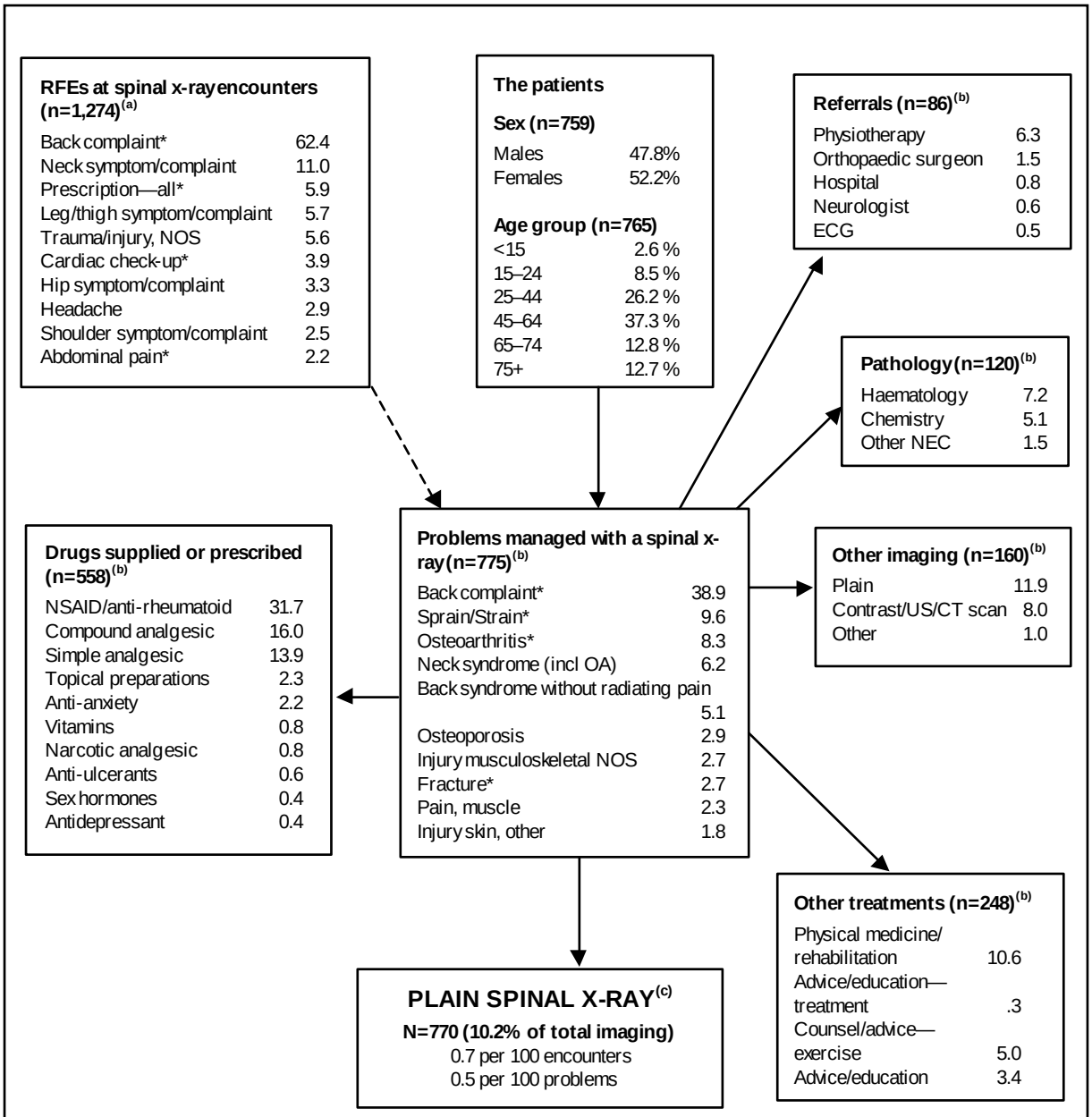
Other treatments were carried out at a rate of 32.0 per 100 problem. Physical medicine/rehabilitation was the most common other treatment carried out for these problems.

Referrals, tests and investigations

Referrals were recorded for 86 problems managed with a spinal x-ray. A referral for physiotherapy was recorded for 6.3% of problem contacts and an orthopaedic referral for 1.5%.

Pathology tests were ordered at a rate of only 15.5 per 100 problem contacts. The majority of these tests were either haematology or chemistry tests.

Only 160 other imaging tests were ordered for the same problem contact as those with a spinal x-ray. Only 20% of problems had another imaging test ordered concurrently with a spinal x-ray.



(a) Expressed as rates per 100 encounters at which a spinal x-ray was ordered (N=770).
(b) Expressed as rates per 100 problems for which a spinal x-ray was ordered (N=775).
(c) Includes multiple ICPC-2 PLUS codes: L41021–plain x-ray lumbosacral; L41022– plain x-ray cervical; L41023– plain x-ray thoracic; L41024– plain x-ray spine;
* Includes multiple ICPC–2 and ICPC–2 PLUS codes (see Appendix 3).
Note: NOS–not otherwise specified, NEC–not elsewhere classified, US–ultrasound, CT–compumterised tomography, incl OA–including osteoarthritis, ECG–electrocardiogram.

Figure 12.2: Inter-relationship of imaging orders with other variables.
Example: plain spinal x-ray

13 Patient wellbeing and risk factors

13.1 Background

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

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

13.2 Methods

The second annual BEACH data collection period was broken down into 10 blocks of recording, each block comprising five weeks. Each block should include data from 100 GPs, 20 GPs recording per week. Each GP's recording pad of 10 forms was made up of three components (40 A forms, 40 S forms and 20 L forms). Each component covered a different SAND topic, and involved a line of questioning that was asked of the patient or the GP in addition to the encounter-based information.

The order of SAND components in the GPs recording pack is randomised, so that 40 A forms may appear first, second or third in the pad. Randomised ordering of the components ensures that there is no order effect on the quality of the information collected.

Two parts of SAND remain constant for the year across the 10 blocks of the BEACH program. All GPs have 40 A forms in their recording pads and these investigate height and weight (for calculation of body mass index, BMI), patient assessed wellbeing and alcohol use. A single smoking status item is included on all 40 S forms. Questions in the remaining space vary from block to block, and address other aspects of patient health and health care delivery in general practice, effectively subsampling the overall sample.

The population risk factor questions for patient wellbeing, alcohol consumption, BMI and smoking status are constant throughout the year and will remain so in future years. While in the first BEACH year these SAND questions were reported in a separate report together with all other SAND questions, the constancy of their inclusion in the program led the research team to add them to the standard report rather than report them separately each year. The results of other topics covered in SAND will be reported in other publications.

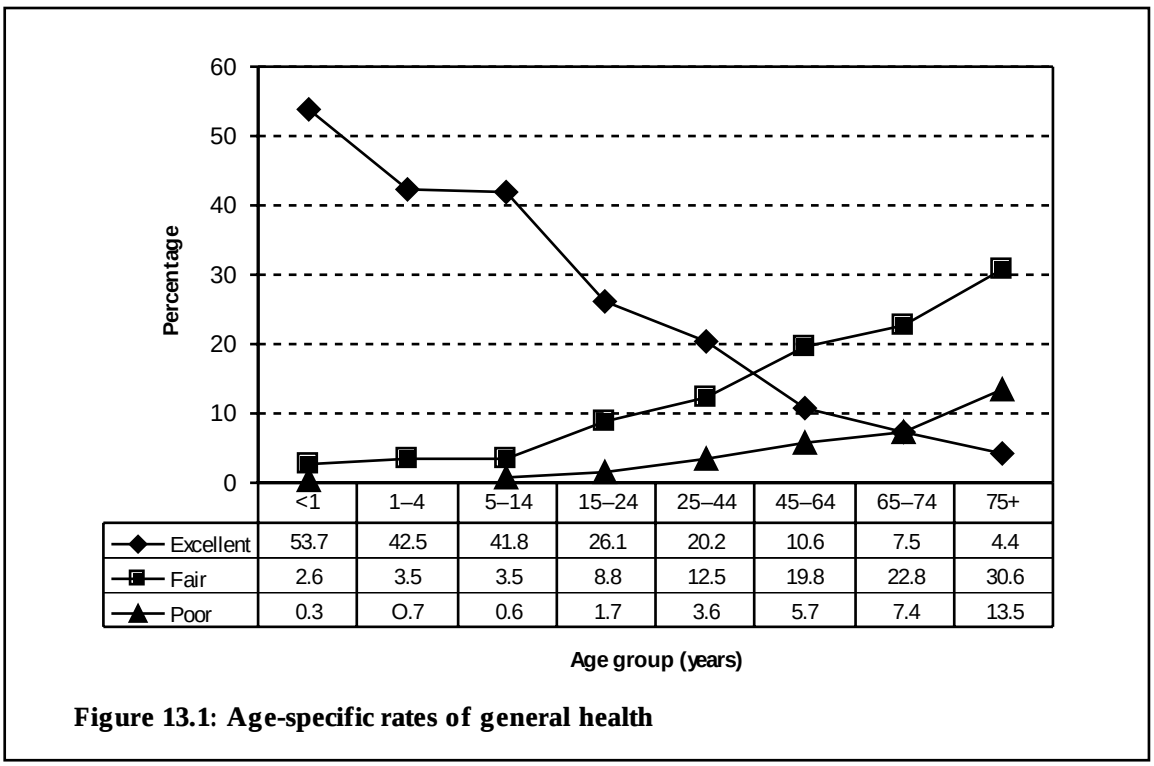
13.3 Wellbeing

Measurement of patient self-assessed wellbeing relied on the single overall health evaluation item question from the SF-36 (Medical Outcomes Study questionnaire) which was designed as a generic indicator of health status (Ware & Sherbourne 1992). This item provides a summary indicator and captures the general impact of health problems on the individual's functional status (McDowell & Newell 1996).

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

- In general would you say your health is: Excellent?
  Very good?
  Good?
  Fair?
  Poor?

Responses to this question were recorded at 37,444 patient encounters from 1,047 GPs. Overall, 17.7% (95% CI: 16.9–18.6) of respondents rated their general health as excellent, while 16.3% (95% CI: 15.8–16.9) rated it as fair and 5.2% (95% CI: 4.8–5.7) rated it as poor. The proportion of encounters with patients rating their health as excellent decreased steadily with age while the proportion rating it as poor increased with age. The distributions of self-rated general health for males and females were comparable. In adult patients aged 18 years and over (N=31,722) 13.7% (95% CI: 12.9–14.4) of respondents rated their health as excellent, while 18.4% (95% CI: 17.8–19.0) rated it fair and 6.0% (95% CI: 5.5–6.5) rated it as poor (Figure 13.1).



	<1	1–4	5–14	15–24	25–44	45–64	65–74	75+
Excellent	53.7	42.5	41.8	26.1	20.2	10.6	7.5	4.4
Fair	2.6	3.5	3.5	8.8	12.5	19.8	22.8	30.6
Poor	0.3	O.7	0.6	1.7	3.6	5.7	7.4	13.5

Figure 13.1: Age-specific rates of general health

13.4 Body mass

Body mass is commonly assessed through the body mass idex (BMI). A person's BMI is assessed by dividing weight (kilograms) by height (metres) squared. A BMI that is less than 20 is considered underweight, 20–24 is normal, 25–29 is overweight and more than 30 is considered to be obese.

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

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

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

Responses were received at 38,660 patient encounters from 1047 GPs. Overall, 17.2% of these encounters were with patients considered obese, and a further 29.5% were with those graded as overweight. A further 16.0% were with underweight patients and 37.3% were with patients whose BMI was in the normal range.

To allow comparison of these results with data from that of the 1995 National Nutrition Survey,analysis was undertaken for adults (aged 18 years or over) by age group and sex. There were 33,069 patient encounters with adults in this sample. Overall, 19.4% (95% CI: 18.8–20.0) of adult patient encounters were with people considered obese, and 33.1% (95% CI: 32.5–33.8) were with those considered overweight. A higher proportion of males were overweight or obese (59.0%) than females (48.1%). While the proportion of patients considered overweight or obese increased with age, the trend reversed at 75 years and over in both sexes (Figure 13.2). These results do not differ markedly from those of 1995 which estimated that 64% of adult males and 49% of women were overweight or obese at that time (AIHW 2000 p 164)**.**

The patient was considered underweight at 8.5% (95% CI: 8.0–8.9) of encounters. However, in the 18–24 years age group, 22.9% of women and 12.4% of men were considered to be underweight (Figure 13.3). These estimates are almost four times those made from the general population in 1995 (underweight measured in that case as BMI<18.5) when only 3% of women and 1% of men were considered underweight and the prevalence in the 18–24 age group for females was about 6%. The use of different underweight cut-off points between the two studies may account for this large difference. However, it is notable that in accepted clinical practice, GPs use a cut-off of BMI<20 rather than <18.5. It is also possible that young women attending general practice are more likely to be underweight than those in the general population. The issue is worthy of further investigation.

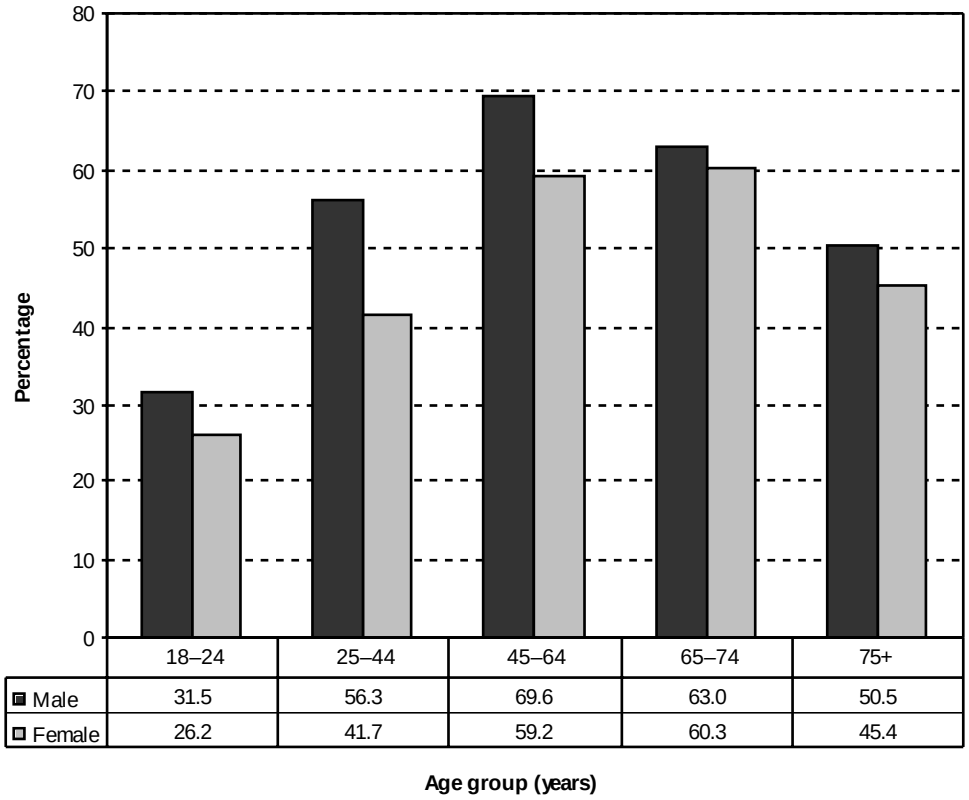


Figure 13.2: Age–sex-specific rates of overweight and obese

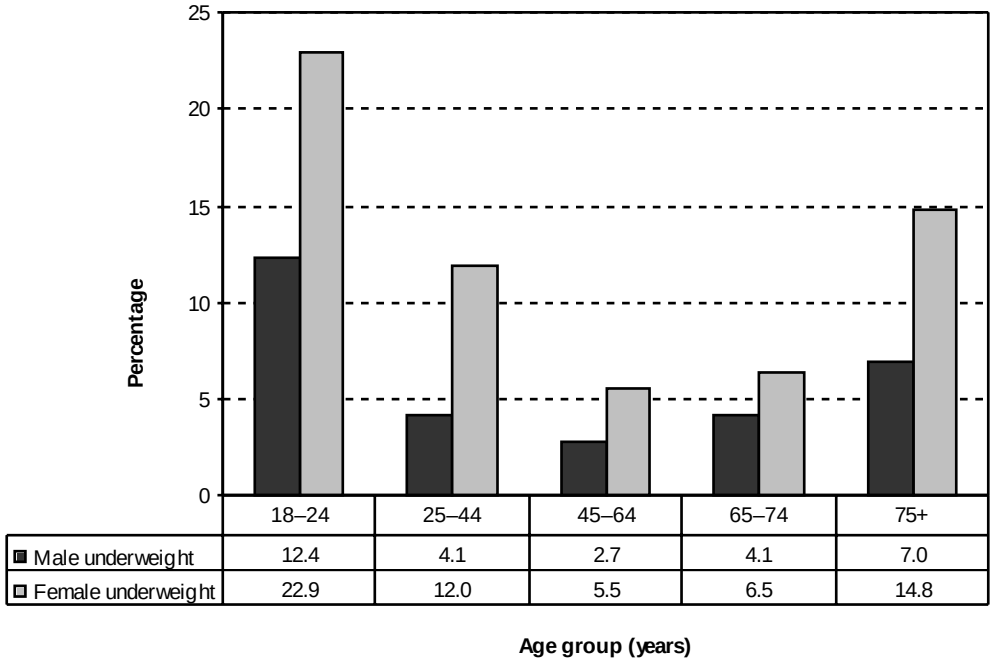
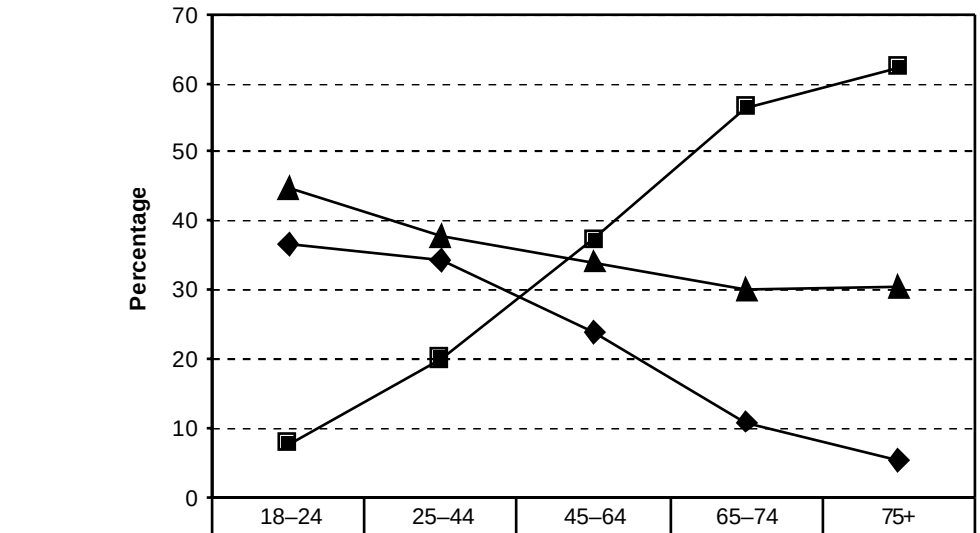


Figure 13.3: Age–sex-specific rate of underweight



	18–24	25–44	45–64	65–74	75+
Male daily	36.7	34.4	23.9	10.9	5.3
Male previous	7.8	20.0	37.3	56.5	62.3
Male never	44.8	37.8	34.1	30.0	30.4

Age group (years)

Figure 13.4: Male age-specific rates—smoking status

3.5 Smoking

It has been estimated that 27% of Australian men and 23% of Australian women are smokers (Hill et al. 1998).

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

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

Responses were received at 32,483 patient encounters with adult patients from 1,044 GPs. Overall, 18.9% (95% CI: 18.2–19.6) of patient encounters were with adults who were daily smokers, 5.2% (95% CI: 4.8–5.7) were with occasional smokers and 27.1% (95% CI: 26.4–27.8) with previous smokers. A greater proportion of males (23.4%) than females (16.2%) were daily smokers. The proportion of smokers decreased with age, with only 5% of male and 4% of female patients aged 75 years and over being daily smokers (Figures 13.4 and 13.5). However, almost 60% of males (and 25% of females) aged 65 years or more were previous smokers. These data suggest a somewhat lower smoking rate in this population at this time when compared with the results from the general population in the 1995 National Health Survey. In that study it was estimated that 27% of men and 20% of women were smokers and 32% of men and 23% of women were ex-smokers (AIHW 2000 p 149).

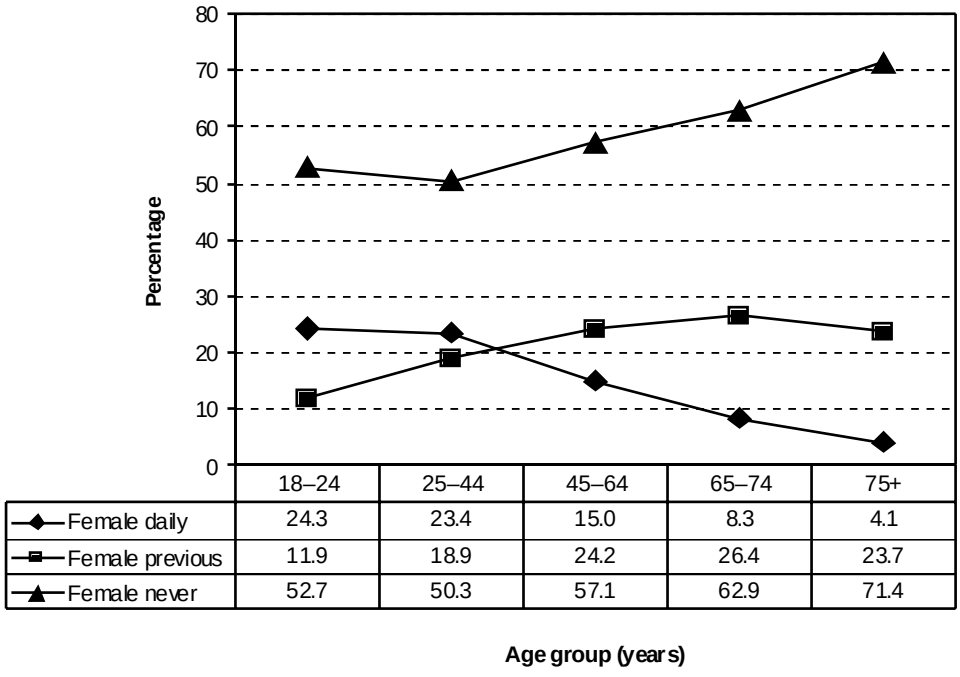


Figure 13.5: Female age-specific rates—smoking status

13.6 Alcohol use

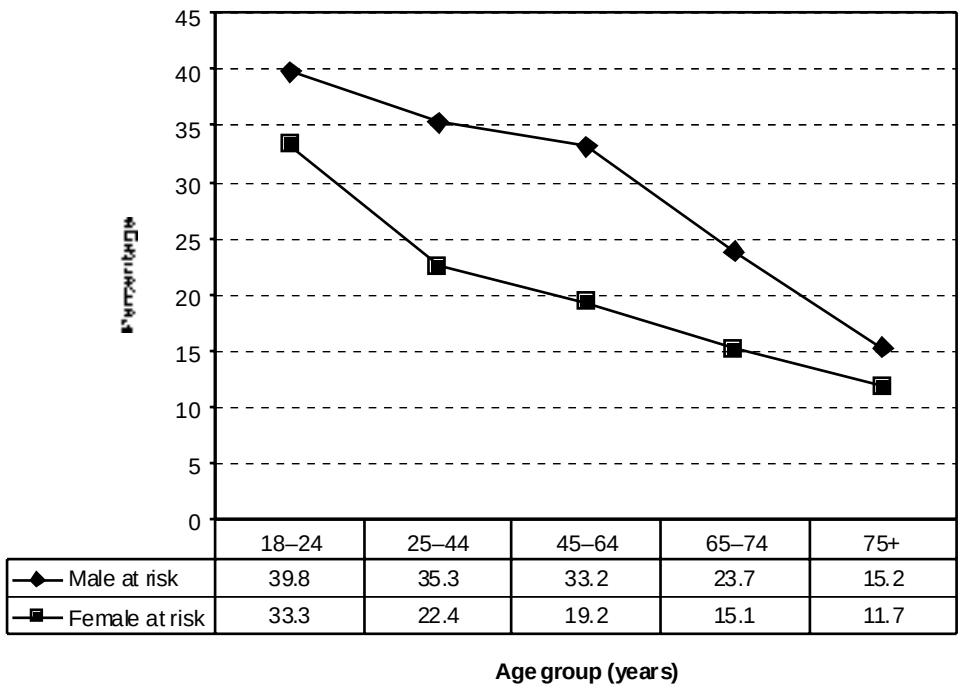
There have been some public health gains in reducing alcohol consumption in recent years. However, alcohol use is the second leading cause of drug-related death in Australia after tobacco(AIHW 2000). It is estimated that 44% of male drinkers and 30% of female drinkers drink regularly to excessive levels (Mattick & Jarvis 1993). National Health Priority Areas also recognises alcohol as an important modifiable cause of premature death and disability in Australia (AIHW 2000 p. 147).

To measure alcohol consumption BEACH uses three items based on from Section A of the WHO Alcohol Use Disorders Identification Test (international version) (Saunders et al. 1993) and the Australian version (Centre for Drug and Alcohol Studies 1993). Together these three questions assess 'at risk' alcohol use. The scores for each question range from 0–4. A score of 5+ for males or 4+ for females suggest that the person's drinking level is placing them at risk.

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

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

A standard drinks chart was provided to each GP to assist the patient in identifying the number of standard drinks consumed.



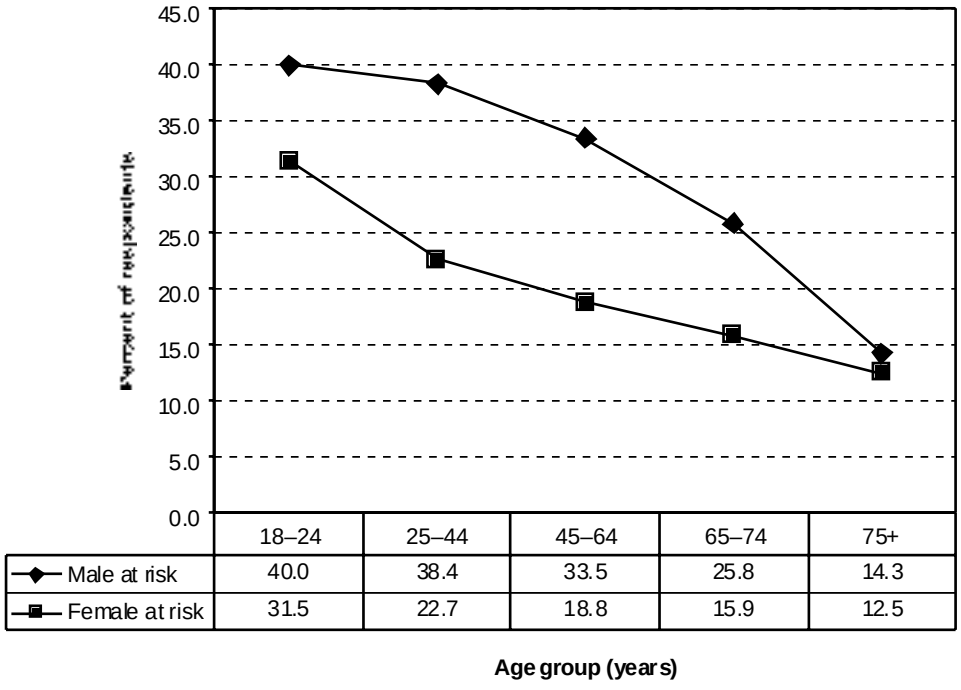
	18–24	25–44	45–64	65–74	75+
Male at risk	39.8	35.3	33.2	23.7	15.2
Female at risk	33.3	22.4	19.2	15.1	11.7

Figure 13.6: Age–sex-specific rate for at risk alcohol use: BEACH 1999–2000

Responses to these questions were recorded at 32,908 patient encounters (18+years) from 1,045 GPs.

Overall, 24.2% (95% CI: 23.4—24.9) of patient encounters were with adults who reported drinking 'at risk' levels of alcohol. Male patients had a higher rate of at risk drinkers (30.3%; 95% CI: 29.2—31.4) than women (20.1; 95% CI: 19.2—21.0). The proportion of patients of both sexs who were at risk drinkers decreased with age. (Figure 13.6) The proportion of adult male drinkers who were drinking at risk levels of alcohol was estimated as being 38.7%. The corresponding figure for women was 32.0%. These estimates are similar to those of Mattick in 1993, though a little lower for males and a little higher for females (Mattick & Jarvis 1993).

There is considerable variance in the methods of calculation used to measure at risk alcohol consumption between different studies. The method of calculation of at risk levels of alcohol consumption reported here for BEACH 1999–2000 used a slightly different process from that applied to the 1998–99 BEACH data. (Sayer et al. 2000). For comparative purposes the new methods of calculation have been applied to the 1998–99 BEACH data and the results are presented in Figure 13.7.



	18–24	25–44	45–64	65–74	75+
Male at risk	40.0	38.4	33.5	25.8	14.3
Female at risk	31.5	22.7	18.8	15.9	12.5

Figure 13.7: Age–sex-specific rate for at risk alcohol use: BEACH 1998–1999

14 Discussion

In this report the results have in general been presented as summaries of the most frequent events that occur in general practice. These summaries serve to direct our attention to those events that, due to their high relative frequency, form a large part of the GP's workload. However, the fact that the top thirty patient reasons for encounter accounted for only 55% of all patient RFEs demonstrates the wide variety of issues that the population presents to GPs, ranging from physical symptoms to psychological and social problems. The top thirty problems managed accounted for less than half of all the problems managed by GPs during the BEACH program and this reflects the breadth of morbidity treated in this primary care environment. For prescribed medications, the thirty most commonly prescribed generic medications represented only 43% of all prescribed medications and this also reflects the wide range of morbidity dealt with in general practice. The relative high rate of provision of clinical services such as advice, health instruction and counselling demonstrates that GPs use a range of non-pharmacological management techniques in their practice and these include regular use of therapeutic procedures.

The number of patients admitted to hospital, referred to the emergency department or to specialists was relatively few (about 8%), indicating the extent to which patients are cared for by GPs in the community without the involvement of the secondary or tertiary sector. Any assessment of the health of the community must therefore consider the contribution of general practice to the provision of acute care and ongoing chronic care to a large proportion of the population.

14.1 Methodological issues

The second year of the BEACH study included some changes to the layout of the forms, based on the experience gained in the first year of the program. The results here reported raise some methodological issues regarding the effect of these changes on GP completion rates for some variables. Issues surrounding the sampling method and the HIC GP characteristic data are also discussed.

14.1.1 The GP sample selection process

The sampling methods developed by the DHAC to select the BEACH sample were well designed and worked well in the first two years of the program (see Section 2.3). However, as the number of projects requiring GP samples has increased, the sample frame has 'rolled over' (particularly in some States) very quickly in recent times. While the speed of the 'roll-over' does not affect samples for one-off projects it does affect large ongoing studies such as BEACH. Fast 'roll-over' can mean that a GP randomly selected in the first quarter of the year can be selected again in the third quarter. These GPs are rejected and not re-approached by the research team. Since the speed of 'roll-over' does not affect all States equally this can influence the State distribution of the GPs who can be approached in any one quarter. In turn this can influence final participation rates in each State. The GP Branch of the DHAC has now overcome this problem by creating a separate database for the BEACH program so that the national sample is not influenced by the extent of research undertaken in each State by other bodies.

14.1.2 Cluster sampling

Section 2.5 described the statistical techniques applied in BEACH. It recognises that the sampling is based on GPs and that for each GP there is a cluster of encounters. It also suggests that each cluster may have its own characteristics, being influenced by the characteristics of the GP. While ideally the sample should be a random sample of GP–patient encounters, such a sampling method is impractical in the Australian health care system. The reader should however be aware that the larger the GP sample and the smaller the cluster the better. The research teams theoretical preference would be for a sample of five or six encounters from every recognised practising GP in the country, distributed evenly through the year. However, there is currently no system in place that could provide a cost-effective means of collecting such a sample of encounters. The sample size of 100,000 encounters from a random sample of 1,000 GPs has been demonstrated to be the most suitable balance between cost and statistical power and validity (Meza et al. 1995).

14.1.3 Response rates

The response rate of GPs to BEACH was 39.1% of those with whom contact was established and this was similar to the response rate for the first year of BEACH (38.4%) (Britt et al. 1999c). Ten per cent of the GPs in the sample provided by the DHAC from the HIC records could not be contacted. A large proportion of these were not practising at the time of recruitment, having retired, died, gone overseas or taken maternity leave since their selection from the HIC records. As the aim is to represent active, practising GPs the exclusion of these GPs from the sample is a valid and necessary action. However, there were also some GPs who had left the practice and could not be traced. In many of these cases the practice informed recruiting staff that the GP selected had not been at the practice for some years. This suggests that the HIC system of practice address registration is not error free.

GPs aged less than 35 years were under-represented in the final GP sample and this could be due to the fact that general practice registrars are not required to undertake QA activities during training and during the QA triennium of completion of training. Some incentives need to be introduced to encourage participation of these younger GPs in BEACH. A similar problem will arise with recruitment of the increasing number of unrecognised GPs now allowed to practice in needy rural areas, who by special arrangement can claim A1 Medicare items of service but who are not required to undertake QA activities. Incentives are also required to encourage the participation of these GPs to ensure sufficient representation of general practice in these areas.

14.1.4 Disagreement between self-reported GP characteristics data and those from the HIC

In Section 3 the characteristics of the BEACH GPs were described on the basis of the data provided by the participants themselves (see Table 3.2 and the GP questionnaire in Appendix 2). In contrast, Table 3.3 relies on the HIC GP characteristic data (to allow for the comparison of participants with non-participants). Note that while the sex distribution in the two data sets is in agreement, there is slight disagreement in the number purported to have graduated in Australia. More importantly, the age distribution of the participants according to HIC records differs markedly from that of the data provided by the GPs themselves. While this has no significant impact on the BEACH study it is worthy of note for other researchers relying on GP characteristic data drawn from the HIC records.

14.1.5 GP response levels for patient characteristics and to the number of repeats

In Section 6 the significantly lesser proportion (compared with the 1998–99 BEACH year) of patients marked on the form as being health care card holders and the lesser proportion marked as being from a non-English-speaking background was noted. As earlier suggested (see Section 6), this could well be due to the revised format of the form in the second year. GPs were no longer asked to tick 'yes' or 'no' next to each of the patient characteristics, but asked only to tick the box against each characteristic applying to the patient. The research team believes that this led to a significant under-reporting compared with the previous year. The format of the questions is being reconsidered in an attempt to improve the response level.

14.1.6 The count of Indigenous patients

The proportion of patients recorded as being Aboriginal people or Torres Strait Islanders was also less in 1999–2000 than in the previous year. Due to the small sample size the difference was not statistically significant but this is also likely to be a result of the layout change described above. However, even the estimates of the number of encounters with Indigenous people from the 1999–2000 data (1.2%) may be an underestimate as it is dependent on self-identification in response to GP inquiry.

14.1.7 Count of repeat prescriptions

As discussed in Section 9.3.1,there was a very high level of missing data in the 'number of repeats' fields. This makes it difficult to reliably extrapolate to the total number of intended prescriptions (i.e. original plus repeats). The extrapolations can be based on two possible assumptions: that for all missing repeat data the GP intended that no repeats be given or that missing data are random and distributed across all medication types in a similar manner to those for which repeat status was recorded. Neither of these two assumptions proved acceptable and the extrapolated estimate of the total number of prescriptions (original + repeats) intended by GPs across Australia in one year had to be provided as being within the range of 190 million and 300 million per year. While this is a very broad estimate it does not negate the importance of the huge difference between even the lowest possible estimate (190 million) and the PBS data which counts only those prescriptions that are paid by the PBS. However, the research team is reviewing the layout of the form for the coming BEACH year in an effort to improve the completion rate of the number of repeats for each prescription.

14.2 Data collection from electronic health records

14.2.1 Future national data collection for electronic health records?

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

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

The research team believes that for the reasons outlined above it will be many years before data collection programs aiming to honestly describe national general practice activity will be able to rely on passive data collection directly from EHRs. However we believe there could be a middle step: *active* collection of data from electronic clinical systems. Active collection requires specifically designed software to interface with the clinical system in use. The software would draw all available data directly from the medical record into the minimum data set. At the end of the consultation the GP could be asked to complete any elements of the data set that have not been filled automatically, or to specify that the encounter included no activity in that field to record.

However, before the rollout of such an option for BEACH participants, it will be important to test the extent to which data collected in this manner reflects that collected on structured paper encounter forms. A controlled trial comparing the two data collection methods is therefore planned.

14.2.2 National data collection from the Better Medication Management System?

Others have suggested that the introduction of the Better Medication Management System (BMMS) planned for 1 July 2001 will provide a reliable source of data regarding patient management. The BMMS allows the GP to electronically transmit the prescription to an electronic database and allows the optional inclusion of comments by the prescribing GP, which may include reasons for the prescription (DHAC 2000b).

Unfortunately this will not provide a reliable national data source for pharmaco-epidemiological research for the following reasons:

- The BMMS will operate on an 'opt-in' basis for the GP, the patient and the pharmacy. Both patient and GP must participate in the system if the prescription is to be transmitted electronically.
- The GP and the patient will have the choice as to whether or not to record comments on the prescription.
- The BMMS will not have a record of any problem contacts that do not result in a prescription. This means that even if all GPs, patients and pharmacists participate and if a diagnosis / problem label was recorded in the comments at all times, no estimate of the relative rate of prescribing for a specific problem could be calculated. For example: in measuring change in the relative rate of GP prescribing of antibiotics for URTI a measured decrease in the number of prescriptions electronically transmitted for antibiotics for URTI could not be assumed to mean a relative decrease in overall prescribing rate. There is no base measure of the number of encounters at which URTI was managed, nor a measure of the number of patients presenting at least once for URTI.

14.3 Comparing BEACH data with those from other sources

Users of the data reported in this publication might wish to compare the results with those from other sources, such as the HIC (HIC 1999). While integration of data from multiple sources can provide a more comprehensive picture of the health of the Australian community, the user must keep in mind the limitations of each data set and the differences between them. Some examples are presented below:

14.3.1 The Pharmaceutical Benefits Scheme

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

- Each prescription recorded in the BEACH program reflects the GPs intent that the patient receives the prescribed medication and the specified number of repeats. The prescription, irrespective of the number of repeats ordered, is counted only once.
- Prescriptions are counted in BEACH irrespective of whether or not the medication is covered by the PBS at all, or for all patients, or for those holding a health care card or who have reached the safety net threshold.

- The BEACH data does not inform us of the number of prescriptions not filled by the patient (and neither does the PBS).

In contrast, the PBS data:

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

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

14.3.2 The Medicare Benefits Schedule items

If comparing the BEACH data with Medicare data it must be remembered that:

- The BEACH participants have the opportunity to only record a single Medicare item number on each encounter form. They are instructed to select the more general item number where two item numbers apply to the consultation because additional services attracting their own item number (e.g. 30026–repair of wound) are counted as actions in other parts of the form. This results in a lesser number of 'other' Medicare items than would be counted in the Medicare data.
- The BEACH database includes data about all clinical activities, not only those billed to the MBS. Both direct (patient seen) and indirect (patient not seen but a clinical activity undertaken) consultations are recorded. Some of these are paid by other funding sources (such as State health departments, private insurance companies, workers compensation etc.) and some are provided free of charge by the GP (see Section 5). In contrast, the MBS data includes only those GP services that have been billed to Medicare.

These two factors must affect the age and sex distribution of the patients encountered in BEACH when compared with that of encounters billed to Medicare. This issue is discussed in Section 4.

14.3.3 Pathology data from the MBS

The BEACH database includes details of pathology tests ordered by the participating GPs. When comparing these data to those in the MBS it must be remembered that:

- BEACH reflects the GPs intent that the patient present for the pathology test(s) ordered and information as to the extent to which patients do not have the test done is not available.
- Each pathology company can respond differently to a specific test order label recorded by the GP. Further, the pathology companies can only charge MBS for the three most expensive tests undertaken even where more were actually undertaken. This is called 'coning' and is part of the DHAC pathology payment system.

- Pathology MBS items contain pathology tests grouped on the basis of cost. An item may therefore not give a clear picture of the precise tests performed.

The effect of these factors is that the MBS pathology data includes only those tests billed to the MBS after interpretation of the order by the pathologist and after selection of the three most expensive tests. This effect will not be random. For example, an order for four tests to review the status of a patient with diabetes it is likely that the HbA1c will be the least expensive and will 'drop' off the billing process due to coning. This would result in an underestimate of the number of HbA1cs being ordered by GPs.

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

Those interested in GP pathology ordering will find more detailed information from the BEACH program in 'Pathology ordering by general practitioners in Australia 1998' (Britt et al. 1999a).

14.3.4 Imaging data from the MBS

Some of the issues discussed regarding pathology data also apply to imaging data. While coning is not an issue for imaging, radiologists are free to decide whether or not the test ordered by the GP is the most suitable and whether to undertake other tests of their choosing. The MBS data therefore reflects the tests that are actually undertaken by the radiologist while the BEACH data reflects those ordered by the GP.

15 Conclusion

This report has provided an overview of general practice activity in Australia in 1999–2000. BEACH provides the profession of general practice, researchers and those in policy development and health plannin, with a rich data source, a database that enumerates the clinical activities of general practitioners. Further, the report describes the normative behaviour of over one thousand general practitioners who together have more than 10,000 years of clinical experience in this role. Such studies of normative data may well contribute to the development of guidelines of care in the future.

The summary inter-relationship diagrams included in this report may provide the reader with an indication of current practice in the selected areas. Analyses such as these (with greater specificity than reported in the summaries in this report) can be undertaken on innumerable topics associated with the morbidity of the patient population of general practice, its management, the health of specific groups or the practice styles of GPs selected on the basis of geography, sex or another GP characteristic.

This year's BEACH data will act as the second measurement point in future trend analyses of changes in general practice clinical activity—changes that may occur in response to changes in the structure and the payment system of general practice, educational interventions, public education campaigns, or changes in the wider health care system. The continuing nature of the program will facilitate tracking of these changes over time. Trend analyses will begin when there are three measurement points, after the third year of the program.

There is still a need for longitudinal de-identified data that would allow assessment of medium and long-term outcomes of care. While BEACH will evolve with the changing data needs of those organisations supporting the program and with the increased adoption of computer technology in general practice (as earlier discussed in Section 14), it will be some time before the standards required for reliable collection of data via computer will be in place. The General Practice Statistics and Classification Unit continues to work on the development of the analytical techniques to ensure that the program will move forward with technology as the problems (earlier discussed) are overcome.

A number of other publications in the General Practice series are planned for the future. These will include a comparative study of the practice patterns of GPs in rural and metropolitan areas who participated in the first two years of the BEACH program. Brief summaries of results of the other SAND topics covered in the second year of the program will soon be available on the web (ee Accessing BEACH data, Section 15.1). Some of these topics will be reported more fully in specific subject publications related to the National Health Priority Areas and to patient population subgroups.

A wide range of people from government, industry and research organisations is currently using BEACH data. The uses to which they have already been put in the area of policy development have been summarised elsewhere (Britt & Miller 2000). The potential of this rich database is immense for those interested in health services research, population health, health economics or quality of health care. The numbers of research questions that can be applied to the database are innumerable. The examples of analyses of the relational database pertaining to specific areas of interest may help others better understand the ways in which the data could be utilised. The ongoing nature of BEACH will ensure an ever-increasing sample size so that the reliability of the data in describing even relatively rare events will constantly improve.

15.1 Current status of BEACH

The BEACH program is now in its third year. The database for the first 2.5 years includes data pertaining to approximately 254,000 GP–patient encounters from more than 2,500 GPs. While this report concentrates on the more common events occurring in general practice over one year, the full database allows investigation of far less frequent events. For example, those interested in encounters at which the patient is referred to the emergency department of a hospital would find that while such referrals only occur at a rate of 1 per 1000 encounters, there would be approximately 250 cases in the current database. This would be sufficient to provide an overview of the types of patients and the pattern of problems referred to an emergency department. The same concept applies to those morbidities that are relatively rare and to medications prescribed on an infrequent basis.

15.2 Access to the BEACH data

15.2.1 Public domain

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

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

Abstract No.	Subject	No. encounters	No. GPs
1	Allergic rhinitis	4,077	102
2	Anxiety-stress, consultation time, level of education	3,684	100
3	Asthma	4,285	213
4	Cardiovascular disease:	2,119	106
5	Depression	8,333	309
6	Employment status and workers' compensation claims	8,833	221
7	Health services utilisation, lifestyle status and chronicity	2,124	106
8	Hormone replacement therapy	2,063	100
9	Influenza and absenteeism	4,228	106
10	Length of consultation; after hours arrangements; co-oribidity	6,328	210
11	Patient employment status and occupation	4,385	110
12	Smoking and passive smoking	3,944	100

15.2.2 Participating organisations

Organisations providing funding for the BEACH program receive quarterly summary reports of the encounter data and standard reports about their subjects of interest. Analysis of the data is a complex task. The General Practice Statistics and Classification Unit has therefore designed standard report formats that cover most aspects of the subject under investigation.

Standard reports have multiple possible entry points. For example:

- population-based (e.g. the elderly; non-English-speaking background patients);
- encounter type (e.g. long consultations);
- GP type (e.g. rural practitioners);
- test ordering (e.g. pathology of any sort; a specific pathology test)
- referral (e.g. those patients and problems for which a referral to a surgeon was made);
- medication-based analyses for individual medications (brand or generic), medication subgroups or medication groups; and
- diagnostically based analyses for individual ICPC–2 PLUS codes (e.g. uncomplicated hypertension), ICPC individual code (e.g. hypertension; nephropathy), ICPC grouper (e.g. all hypertension), ICPC chapter-component level (e.g. digestive symptoms), or ICPC chapters (e.g. all cardiovascular problems).

Individual data analyses are conducted where the specific research question is not adequately answered through standard reports.

15.2.3 External purchasers of standard reports

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