

# 12 Investigations

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

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

There were no tests recorded at the vast majority (80.8%) of encounters. At least one pathology test order was recorded at 14.0% of encounters (for 10.8% of problems managed) and at least one imaging test was ordered at 6.9% of encounters (for 5.0% of problems managed) (Table 12.1).

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

	Number of encs	Per cent of encs (n=96,973)	95% LCL	95% UCL	Number of problems (n=139,092)	Per cent of problems	95% LCL	95% UCL
Pathology and imaging ordered	1,625	1.7	1.5	1.8	1,244	0.9	0.8	1.0
Pathology only ordered	11,936	12.3	11.8	12.8	13,826	9.9	9.6	10.3
Imaging only ordered	5,071	5.2	5.0	5.5	5,641	4.1	3.9	4.2
<b>No tests ordered</b>	<b>78,341</b>	<b>80.8</b>	<b>80.2</b>	<b>81.4</b>	<b>118,380</b>	<b>85.1</b>	<b>84.7</b>	<b>85.6</b>
<b>At least one pathology ordered</b>	<b>13,561</b>	<b>14.0</b>	<b>13.5</b>	<b>14.5</b>	<b>15,071</b>	<b>10.8</b>	<b>10.4</b>	<b>11.2</b>
<b>At least one imaging ordered</b>	<b>6,696</b>	<b>6.9</b>	<b>6.6</b>	<b>7.2</b>	<b>6,885</b>	<b>5.0</b>	<b>4.7</b>	<b>5.2</b>

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

## 12.1 Pathology ordering

A comprehensive report on pathology ordering by general practitioners in Australia in 1998, written by the GP Statistics and Classification Unit using BEACH data, was published on the Internet by the Diagnostics and Technology Branch of the Department of Health and Aged Care during 2000.<sup>29</sup> For a more detailed study of pathology ordering, consult that publication; readers may wish to compare those results with the information presented below. A report on trends in pathology ordering over the period 1998 to 2000 inclusive will be released early in 2003.

## Nature of pathology orders at encounter

There were 30,086 orders for a pathology test (or battery of tests) and these were made at a rate of 31.0 per 100 encounters. Table 12.2 provides a summary of the different types of pathology tests that were ordered by the participating GPs.

The pathology tests recorded were grouped according to the categories set out in Appendix 3. The main pathology groups reflect those used in previous analyses of pathology tests recorded by the HIC.<sup>30</sup>

The top four pathology test groups were Chemistry, Haematology, Microbiology and Cytology and together these accounted for over 90% of all pathology test orders. The fifth largest group was Other NEC (other pathology test orders that could not be classified elsewhere), which made up 2.2% of all pathology test orders. The size of this group was in part due to the non-specificity of the recording of some pathology orders by some GPs (e.g. blood test).

The largest of the groups, Chemistry, accounted for 53.1% of all tests and was recorded at a rate of 16.5 per 100 encounters. Within this group the most frequently ordered test was lipids (18.6%) followed by EUC (12.8%). Full blood count (68.1%) was the largest group within Haematology and urine, microscopy, culture and sensitivity (urine MC&S) (34.6%) was the largest in Microbiology.

The most frequently ordered test types were full blood count; lipids; electrolytes, urea and creatinine (EUC); liver function; glucose; urine MC&S; and Pap smear tests. Full blood counts accounted for 13.5% of tests and were ordered at a rate of 4.2 per 100 encounters. Pap smears accounted for 4.9% of all tests and made up the greater proportion of the Cytology group (96.7%). Lipid tests were ordered at a rate of 3.1 per 100 encounters (Table 12.2).

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

Pathology test ordered	Number	Per cent of all pathology	Per cent of group	Rate per 100 encs (n=96,973)	95% LCL	95% UCL
<b>Chemistry</b>	<b>15,968</b>	<b>53.1</b>	<b>100.0</b>	<b>16.5</b>	<b>15.6</b>	<b>17.3</b>
Lipids	2,968	9.9	18.6	3.1	2.8	3.3
EUC	2,039	6.8	12.8	2.1	1.8	2.4
Liver function	1,993	6.6	12.5	2.1	1.8	2.3
Glucose—all	1,946	6.5	12.2	2.0	1.8	2.2
Thyroid function	1,607	5.3	10.1	1.7	1.5	1.8
Multi-biochemical analysis	1,086	3.6	6.8	1.1	0.6	1.7
Hormone assay	757	2.5	4.7	0.8	0.5	1.0
Ferritin	693	2.3	4.3	0.7	0.5	0.9
HbA1c	689	2.3	4.3	0.7	0.5	0.9
Chemistry; other	513	1.7	3.2	0.5	0.3	0.7
<b>Haematology</b>	<b>5,965</b>	<b>19.8</b>	<b>100.0</b>	<b>6.2</b>	<b>5.8</b>	<b>6.5</b>
Full blood count	4,060	13.5	68.1	4.2	4.0	4.4
Erythrocyte sedimentation rate	945	3.1	15.8	1.0	0.7	1.2
Coagulation	698	2.3	11.7	0.7	0.5	0.9

(continued)

**Table 12.2 (continued): Distribution of pathology orders across MBS pathology groups and most frequent individual test orders within group**

Pathology test ordered	Number	Per cent of all pathology	Per cent of group	Rate per 100 encs (n=96,973)	95% LCL	95% UCL
<b>Microbiology</b>	<b>4,702</b>	<b>15.6</b>	<b>100.0</b>	<b>4.9</b>	<b>4.5</b>	<b>5.2</b>
Urine MC&S	1,627	5.4	34.6	1.7	1.5	1.8
Microbiology; other	578	1.9	12.3	0.6	0.4	0.8
Hepatitis serology	558	1.9	11.9	0.6	0.3	0.9
Vaginal swab and C&S	310	1.0	6.6	0.3	0.1	0.6
HIV	278	0.9	5.9	0.3	0.1	0.5
Faeces MC&S	244	0.8	5.2	0.3	0.0	0.5
Chlamydia	198	0.7	4.2	0.2	0.0	0.5
<b>Cytology</b>	<b>1,533</b>	<b>5.1</b>	<b>100.0</b>	<b>1.6</b>	<b>1.3</b>	<b>1.8</b>
Pap smear	1,481	4.9	96.7	1.5	1.3	1.8
<b>Other NEC</b>	<b>666</b>	<b>2.2</b>	<b>100.0</b>	<b>0.7</b>	<b>0.5</b>	<b>0.9</b>
Other test NEC	314	1.0	47.2	0.3	0.0	0.6
Blood test	161	0.5	24.2	0.2	0.0	0.5
<b>Infertility/pregnancy</b>	<b>286</b>	<b>1.0</b>	<b>100.0</b>	<b>0.3</b>	<b>0.1</b>	<b>0.5</b>
<b>Tissue pathology</b>	<b>459</b>	<b>1.5</b>	<b>100.0</b>	<b>0.5</b>	<b>0.1</b>	<b>0.8</b>
Histology; skin	459	1.5	100.0	0.5	0.1	0.8
<b>Immunology</b>	<b>452</b>	<b>1.5</b>	<b>100.0</b>	<b>0.5</b>	<b>0.3</b>	<b>0.7</b>
Rheumatoid factor	145	0.5	32.0	0.2	0.0	0.4
<b>Simple basic tests</b>	<b>55</b>	<b>0.2</b>	<b>100.0</b>	<b>0.1</b>	<b>0.0</b>	<b>0.4</b>
<b>Total pathology tests</b>	<b>30,086</b>	<b>100.0</b>	<b>100.0</b>	<b>31.0</b>	<b>29.7</b>	<b>32.4</b>

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

## Problems associated with pathology tests

Table 12.3 describes, in decreasing order of frequency, the most common problems under management for which pathology was ordered. There were 15,071 problems to which pathology tests were linked (Table 12.1), the average number of pathology tests being 2.04 per tested problem. The five problems accounting for the highest number of pathology tests ordered were diabetes (5.9% of problem-combinations), hypertension (5.8%), lipid disorder (5.0%), weakness/tiredness general (4.2%), and female genital check-up (including Pap smear) (4.0%). 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 8,735 hypertension problems recorded in the data set (6.3% of problems). Diabetes (2.2% of problems) was managed far less frequently. However, it accounted for more pathology tests than did hypertension. There were 1,816 test orders (5.9%) associated with diabetes and 1,794 test orders (5.8%) associated with hypertension. This is because 25.4% of diabetes contacts resulted in a pathology test compared with only 7.8% of contacts with hypertension.

Weakness/tiredness was not a problem label that ranked in the top 30 problems managed in general practice, yet it ranked fourth highest in the problems associated with pathology ordering. This is because the decision to order a pathology test for weakness/ tiredness was relatively frequent (50.3% of contacts generating an order) and where such a decision was made, multiple pathology tests were likely (averaging 364.7 test orders per 100 problems). The problem label of female genital check-up/Pap smear, and the associated Pap smear test, provide a useful contrast as multiple tests were rarely ordered.

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

Problem managed	Number of problems	Number of problem/path combinations <sup>(a)</sup>	Per cent of problem/path combinations <sup>(a)</sup>	Per cent of problems with test <sup>(b)</sup>	Rate of path orders per 100 problems with pathology <sup>(c)</sup>
Diabetes*	2,993	1,816	5.9	25.4	238.8
Hypertension*	8,735	1,794	5.8	7.8	262.1
Lipid disorder	2,841	1,525	5.0	27.7	194.0
Weakness/tiredness general	702	1,287	4.2	50.3	364.7
Female genital check-up*	1,526	1,224	4.0	71.3	112.5
General check-up*	1,723	1,182	3.8	26.0	263.9
UTI*	1,556	919	3.0	51.7	114.3
Pregnancy*	859	613	2.0	35.9	198.8
Blood test NOS	203	528	1.7	77.3	336.4
Test results*	687	477	1.6	43.5	159.7
<i>Subtotal</i>	<i>21,825</i>	<i>11,365</i>	<i>37.0</i>	<i>..</i>	<i>..</i>
<b>Total</b>	<b>139,091</b>	<b>30,816</b>	<b>100.0</b>	<b>10.6</b>	<b>192.3</b>

(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 30,086 pathology test orders and 30,816 problem/pathology combinations.

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

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

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

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

## 12.2 Imaging ordering

A comprehensive report on imaging orders by general practitioners in Australia in 1999-00, written by the GP Statistics and Classification Unit using Beach data, was published by the AIHW in 2001.<sup>31</sup> Readers wishing a more detailed study of imaging orders should consult that publication and may wish to compare those results with the information presented below.

### Nature of imaging orders at encounter

There were 7,643 orders for imaging and these were made at a rate of 7.9 per 100 encounters. At least one imaging test was ordered at 6.9% of encounters and for 5.0% of problems managed. The imaging tests recorded were grouped into one of five categories – Diagnostic radiology, Ultrasound, Computerised tomography, Nuclear medicine imaging and Magnetic resonance imaging (Appendix 3). Diagnostic radiology made up almost two-thirds (58.1%) of all imaging tests, Ultrasound accounted for 31.6%, CT scanning 9.5%, Nuclear medicine 0.5% and MRI 0.4%.

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

Imaging test ordered	Number	Per cent of tests	Per cent of group	Rate per 100 encounters (n=96,973)	95% LCL	95% UCL
<b>Diagnostic radiology</b>	<b>4,437</b>	<b>58.1</b>	<b>100.0</b>	<b>4.6</b>	<b>4.4</b>	<b>4.8</b>
X-ray; chest	910	11.9	20.5	0.9	0.8	1.1
X-ray; knee	399	5.2	9.0	0.4	0.3	0.6
Mammography	363	4.8	8.2	0.4	0.2	0.5
X-ray; foot/feet	206	2.7	4.7	0.2	0.0	0.4
X-ray; hip	193	2.2	4.3	0.0	0.0	0.4
X-ray; shoulder	184	2.1	4.1	0.2	0.0	0.4
X-ray; ankle	179	2.4	4.0	0.2	0.0	0.4
X-ray; spine; lumbosacral	173	2.3	3.9	0.2	0.0	0.4
Test; densitometry	150	2.0	3.4	0.2	0.0	0.4
X-ray; wrist	149	2.0	3.4	0.2	0.0	0.4
X-ray; hand	140	1.8	3.2	0.1	0.0	0.4
X-ray; spine; cervical	99	1.3	2.2	0.1	0.0	0.4
X-ray; finger(s)/thumb	97	1.3	2.2	0.1	0.0	0.3
X-ray; spine; lumbar	96	1.3	2.2	0.1	0.0	0.4
Scan; bone(s)	90	1.2	2.0	0.1	0.0	0.4
X-ray; abdomen	84	1.1	1.9	0.1	0.0	0.4
X-ray; elbow	81	1.1	1.8	0.1	0.0	0.4
X-ray; spine; thoracic	56	0.7	1.3	0.1	0.0	0.3
<b>Ultrasound</b>	<b>2,416</b>	<b>31.6</b>	<b>100.0</b>	<b>2.5</b>	<b>2.3</b>	<b>2.7</b>
Ultrasound; pelvis	444	5.8	18.4	0.5	0.3	0.6
Ultrasound; abdomen	251	3.3	10.4	0.3	0.0	0.5
Ultrasound; shoulder	219	2.9	9.1	0.2	0.0	0.4
Ultrasound; breast	196	2.6	8.1	0.2	0.0	0.4
Ultrasound	127	1.7	5.3	0.1	0.0	0.4
Ultrasound; obstetric	124	1.6	5.1	0.1	0.0	0.5
Ultrasound; abdomen upper	123	1.6	5.1	0.1	0.0	0.4
Test; doppler	112	1.5	4.6	0.1	0.0	0.4
Ultrasound; renal tract	96	1.3	4.0	0.1	0.0	0.4
<b>Computerised tomography</b>	<b>723</b>	<b>9.5</b>	<b>100.0</b>	<b>0.8</b>	<b>0.6</b>	<b>0.9</b>
CT scan; brain	121	1.6	16.8	0.1	0.0	0.4
CT scan; spine; lumbosacral	88	1.2	12.1	0.1	0.0	0.5
CT scan; head	86	1.1	11.9	0.1	0.0	0.4
<b>Nuclear medicine imaging</b>	<b>35</b>	<b>0.5</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.4</b>
<b>Magnetic resonance imaging</b>	<b>31</b>	<b>0.4</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.5</b>
<b>Total imaging tests</b>	<b>7,643</b>	<b>100.0</b>	<b>..</b>	<b>7.9</b>	<b>7.6</b>	<b>8.2</b>

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

Chest x-rays were by far the most common sub-group in Diagnostic radiology (20.5%) while x-ray of the knee (9.0%) and mammography (8.2%) followed. Ultrasound was commonly of the pelvis (18.4%) abdomen (10.4%), or shoulder (9.1%). CT scans were most commonly performed on the brain (16.8%) or lumbosacral spine (12.1%) or on the head (11.9%).

Overall the most frequently ordered imaging test was chest x-ray which accounted for 11.9% of all imaging and was ordered at a rate of 0.9 per 100 encounters. Pelvic ultrasound, the second most frequently ordered, accounted for 5.8% of all imaging tests and was ordered at a rate of 0.5 per 100 encounters (Table 12.4).

## Problems associated with orders for imaging

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

There were 7,695 problem-imaging combinations. Six (including the top four) of the ten most common problems were related to the musculoskeletal system. The remaining problems were related to abdominal, breast, skin and chest problems.

Back complaint, the most common problem for which imaging was ordered, accounted for 5.9% of all imaging and 15.6% of contacts with a fracture resulted in an imaging order. Fracture accounted for slightly less imaging orders (4.7%). However, 34.5% of contacts with this problem resulted in an order for imaging.

The ordering of multiple imaging for a single problem was much less common than the ordering of multiple pathology. Breast lump/mass (female) had the highest rate of multiple test orders in the top ten problems, 146.6 tests being ordered for every 100 problems.

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

Problem managed	Number of problems	Number of problem/imaging combinations <sup>(a)</sup>	Per cent of problem/imaging combinations <sup>(a)</sup>	Per cent of problems with test <sup>(b)</sup>	Rate of imaging orders per 100 tested problems <sup>(c)</sup>
Back complaint*	2,540	456.7	5.9	15.6	115.5
Fracture*	980	365.0	4.7	34.5	108.0
Osteoarthritis*	2524	329.7	4.3	11.6	112.7
Sprain/strain*	1,750	306.8	4.0	15.3	114.8
Abdominal pain*	577	189.6	2.5	30.6	107.5
Injury musculoskeletal NOS	732	188.3	2.5	23.3	110.3
Breast lump/mass (female)	152	145.7	1.9	65.2	146.6
Injury skin, other	688	139.9	1.8	17.8	114.1
Acute bronchitis/bronchiolitis	2,644	122.9	1.6	4.7	100.0
Bursitis/tendonitis/synovitis NOS	744	120.5	1.6	13.3	121.7
<i>Subtotal</i>	<i>13,331</i>	<i>2,365</i>	<i>30.8</i>	<i>..</i>	<i>..</i>
<b>Total</b>	<b>139,092</b>	<b>7,695</b>	<b>100.0</b>	<b>..</b>	<b>..</b>

(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 7,643 imaging test orders and 7,695 problem/imaging combinations.

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

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

\* Includes multiple ICD-2 and ICD-2 PLUS codes (see Appendix 3).

Note: NOS—not otherwise specified.