13 Changes over time for problem, medication and treatment rates

In the previous chapters there were some significant differences noted across the years in terms of problems managed (Chapter 7), medication rates (Chapter 9) and non-pharmacological treatment rates (Chapter 10). Using simple linear regression, this chapter investigates whether these observed changes represent significant linear trends in management and treatment rates over time.

The next chapter (Chapter 14) uses multiple regression to examine more closely how observed changes in management rates of particular problems and changes in medication rates were reflected in medication management for specific problems of interest.

13.1 Method

Trends over time were analysed by linear regression. SAS regression procedures were used that calculate robust standard errors to correct for the design effect of the cluster sample.[8] Test statistics and p-values based on the robust standard error are more conservative than those that are calculated without taking into account the design effect of the cluster sample. Thus the robust standard error provides a more stringent test of significant changes over time.

Unadjusted trends in problem and medication rates

Changes over time in problem rates per 100 encounters, medication rates per 100 encounters and clinical treatments per 100 encounters were analysed using simple linear regression.

Age and sex adjustment for trends in problem, medication and treatment rates

Where there was a significant change over time in the management rates of problems, medication rates or non-pharmacological treatments, the analysis was performed again, adjusting for age and sex of encounters to examine whether demographic differences across the samples were confounding the effect of time on rates per 100 encounters.

National estimated encounters

Where significant trends were found, the average annual increase or decrease in encounters nationally was estimated by multiplying the average change in management rates by the number of GP–patient encounters that occur in Australia annually (100,000,000 per year).

13.2 Changes in annual management rates of problems between 1998–99 and 2002–03

Changes over time were first examined in terms of changes at the ICPC chapter level. For each chapter with significant changes in management rates over time, the most common problems in that chapter were further examined for specific trends at the ICPC-2 rubric level (including groupers).

No changes in management rates over time

At the ICPC chapter level, rates of problems related to the skin, digestive, musculoskeletal, neurological, cardiovascular, urinary, male and female genital systems, and rates of psychological and social problems, remained steady over the 5-year period.

Increased management rates over time

There was a significant increase over time in the management rate of endocrine and metabolic problems, from 8.8 problems per 100 encounters in 1998–99 to 10.6 problems per 100 encounters in 2002–03 ($p<0.0001$). The average yearly increase in endocrine/metabolic problems was 0.45 problems per 100 encounters.

After adjusting for age and sex, there was little change in the size of the effect, with an adjusted average annual increase of 0.40 problems per 100 encounters ($p<0.0001$), equivalent to an extra 400,000 metabolic endocrine problems nationally. The increase in the management rate of endocrine and metabolic problems was partly explained by an increase in the management rate of lipid disorders, from 2.5 per 100 encounters in 1998–99 to 3.0 per 100 encounters in 2002–03 ($p<0.0001$). The increase in the management rate of lipid disorders after adjusting for age and sex was 0.11 problems per 100 encounters per year ($p=0.0004$). This represents an average annual increase of 110,000 GP contacts with lipid disorder.

The increase in management rate of lipid disorder was not explained by the rate of new cases of lipid disorder, which, after adjusting for age and sex, did not increase significantly over time ($p=0.11$). This indicates that the increased management of lipid disorders is due to the need for ongoing long term management of patients with lipid disorders, rather than an increase in the diagnosis rate of lipid disorders.

The first 4 years of the study saw an increase in the management rate of diabetes from 2.6 per 100 encounters in 1998–99 to 3.1 per 100 encounters in 2001–02. This increase was sustained in 2002–03 with 2.9 diabetes problems per 100 encounters ($p=0.0002$), indicating that there has been a real increase in diabetes management rates since 1998–99. After adjustment for age and sex, there was a small average yearly increase of 0.08 problems per 100 encounters ($p=0.0025$), equivalent to an estimated increase of 80,000 diabetes contacts in general practice nationally.

Decreased management rates over time

There was a significant decrease in the rate of respiratory problems managed, from 24.3 problems per 100 encounters in 1998–99 to 20.6 problems per 100 encounters in 2002–03. This continued the decrease that had been observed between 1999–00 and 2001–02. Averaged

over the 5 years, it is estimated that after adjusting for age and sex, respiratory problem contacts have decreased at a rate of 910,000 encounters per year ($p<0.0001$).

The decrease over time in the management rate of respiratory problems was largely explained by a decrease in the rates for asthma ($p<0.0001$) and acute bronchitis ($p<0.0009$).

The management rate for asthma decreased from 3.2 problems per 100 encounters in 1998–99 to 2.7 problems per 100 encounters in 2002–03 ($p<0.0001$). This is an average annual reduction of 0.11 asthma problems per 100 encounters, equivalent to a decrease of 110,000 asthma encounters nationally per year. However the majority of the decrease in asthma management occurred between 1999–00 (3.2 per 100 encounters) and 2000–01 (2.8 per 100 encounters), with rates levelling off in the last two years.

The acute bronchitis rate decreased from 3.3 per 100 encounters in 1998–99 to 2.6 per 100 encounters in 2002–03 ($p<0.0001$).

The rate of management of problems related to the blood and blood-forming organs decreased significantly, from 1.69 in 1998–99 to 1.37 problems per 100 encounters in 2002–03 ($p<0.0001$). After adjusting for age and sex there was an estimated national annual decrease of 110,000 encounters in the management of blood related problems.

Management of ear problems decreased from 4.9 problems per 100 encounters in 1998–99 to 4.0 problems per 100 encounters in 2002–03 ($p<0.0001$). After adjusting for age and sex, it was estimated that the management of ear problems has been decreasing at an annual rate of 169,000 encounters nationally ($p<0.0001$).

There was a marginal decrease in the rates of eye problems ($p=0.006$), however the size of the trend was small and equivocal.

13.3 Changes in medication rates between 1998–99 and 2002–03

Decreases over time

For prescribed medications (using the CAPS medication group level) there has been a significant decrease in the prescription of antibiotics, from 17.3 prescriptions per 100 encounters in 1998–99 to 13.8 per 100 encounters in 2002–03 ($p<0.0001$). This translates to an estimated rate of decrease of 870,000 antibiotic prescriptions nationally per year. Within antibiotics, the prescription rate for the subgroup cephalosporins has decreased significantly, from 4.3 per 100 encounters in 1998–99 to 3.0 per 100 encounters in 2002–03 ($p<0.0001$), accounting for 37% of the decrease in antibiotic prescribing. The prescribing rates for penicillins and broad-spectrum penicillins remained steady over time (see Appendix 4, Table A4.9).

Respiratory medications decreased from 6.9 prescriptions per 100 encounters in 1998–99 to 5.3 prescriptions per 100 encounters in 2002–03 ($p<0.0001$). Prescriptions for bronchodilators significantly decreased, from 3.7 per 100 encounters in 1998–99 to 2.5 per 100 encounters in 2002–03 ($p<0.0001$). The prescription rate for asthma preventives remained steady over the five years.

There has been little change in the overall prescription rate for central nervous system drugs. However prescription rates for simple and compound analgesics have decreased between 1998–99 and 2002–03, from 4.7 per 100 encounters to 3.9 per 100 encounters for simple analgesics ($p<0.0001$) and from 3.3 per 100 encounters to 2.4 per 100 encounters for compound analgesics ($p<0.0001$).

Increases in prescription rate over time

There was a significant increase in the prescription rate for medications acting on the musculoskeletal system, from 5.7 per 100 encounters in 1998–99 to 6.1 per 100 encounters in 2001–02; however in 2002–03 the rates of *prescribed* medications for musculoskeletal returned to 5.7 per 100 encounters. This is possibly due to the substitution of OTC medications for prescribed medications, in particular ibuprofen. See Appendix, Table A4.12 for trends in OTC medications. See also Chapter 14 for total rates of NSAIDs, prescribed, supplied and advised.

Prescription rates of narcotic analgesics doubled from 1.1 per 100 encounters in 1998–99 to 2.2 per 100 encounters in 2002–03 ($p<0.0001$). This represents an average increase of 270,000 prescriptions per year.

13.4 Changes in non-pharmacological treatments between 1998–99 and 2002–03

Therapeutic procedures

Therapeutic procedures increased from 11.8 per 100 encounters in 1998–99 to 14.7 per 100 encounters in 2001–02, an annual rate of increase of 0.8 per 100 encounters ($p<0.0001$). This is equivalent to an annual increase of 800,000 encounters where the GP performed therapeutic procedures.

Clinical treatments

Clinical treatments increased from 31.4 per 100 encounters in 1998–99 to 38.1 per 100 encounters in 2001–02. In 2002–03 this increase plateaued at 37.2 clinical treatments per 100 encounters ($p<0.0001$).

Lifestyle counselling

Provision of lifestyle counselling increased from 6.4% of encounters in 1998–99 to 8.1% of encounters in 2001–02, a significant increase of 0.6% of encounters per year ($p<0.0001$). However, in 2002–03 the rate of lifestyle counselling fell to 7.4% of encounters, below the rate observed in the previous two years.

14 Selected topics—changes over time

This chapter uses multiple linear regression to examine more closely how observed changes in management rates of particular problems and changes in medication rates were reflected in medication management for selected problems of interest.

Topic selection was based on:

- medications or problems of topical interest in terms of public health initiatives or developments in treatments
- whether there were significant changes in overall rates of management of a problem, in overall rates of a medication or non-pharmacological treatments.

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

- the use of non-steroid anti-inflammatory drugs (NSAIDs) to manage all arthritis (including osteoarthritis and rheumatoid arthritis) versus other musculoskeletal problems
- the use of antibiotics to manage upper respiratory tract infections (URTIs).

14.1 Method

Trends over time were analysed by linear regression. SAS V8.2 regression procedures were used that calculate robust standard errors to correct for the design effect of the cluster sample.[8] Test statistics and p-values based on the robust standard error are more conservative than those that are calculated without taking into account the design effect of the cluster sample. Thus the robust standard error provides a more stringent test of significant changes over time.

Medications included in trends analysis

All medications prescribed, recommended for over-the-counter (OTC) purchase or supplied by the GP were included in the trends analyses in the following section (referred to as 'medication rates' in this section). In contrast, Chapter 9 reports medication rates separately for each of prescribed medications, advised OTC and supplied by the GP, and Chapter 13 reports the trends in prescribed only medications. For some medications, therefore, there are differences in the trends over time between the global medication rates reported here and the prescribing rates in Chapters 9 and 13.

Multiple linear regression of medication rates adjusting for problems

For special topics of interest, multiple linear regression was used to assess changes in selected medication rates over time, after adjusting for the main problems of interest related to that medication.

By adjusting for the problem of interest, it is possible to detect whether:

- there has been a change over time in the medication management for the problem of interest (e.g. Has there been a decrease over the five years in the overall medication rate of antibiotics for URTI?); or
- the observed change in medication rate is explained by a commensurate change in rates of management of the problems for which this medication is prescribed. This would mean there had been no change in medication management for that problem over the five years of the study, and that the observed change in medication rates are due to the change in management rates of the selected problem(s).

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

'Time by problem' interaction terms were entered into the multiple regression models to test whether changes in medication rates over time differed for specific problems of interest. For example, for NSAIDs two interaction terms 'time X arthritis' and 'time X other musculoskeletal problems' were used to test whether any changes in NSAID rates over time was more pronounced for the management of arthritis problems relative to other musculoskeletal problems.

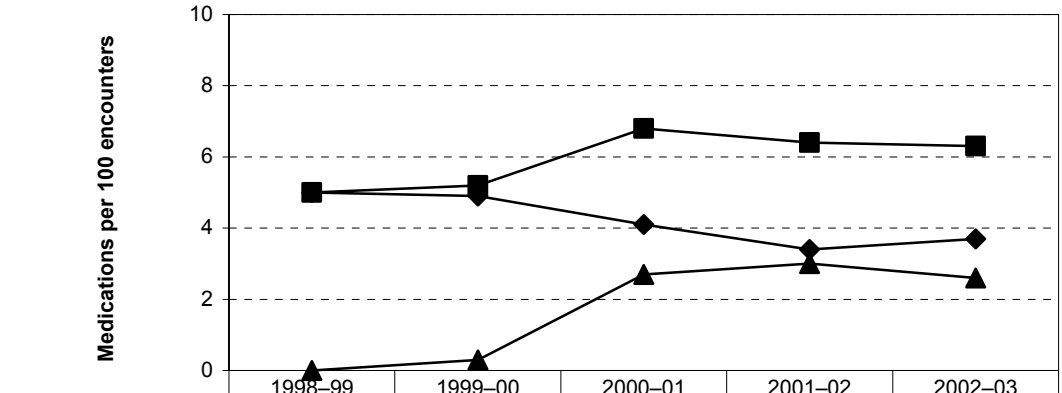
14.2 Non-steroid anti-inflammatory drugs and the management of arthritis and other musculoskeletal problems

Changes over time

NSAIDs were defined as the medications grouped in the ATC code M01A. For analysis, the NSAIDs were further subdivided into Cox-2 inhibitors (ATC subgroup M01A H) and all other NSAIDs.

Musculoskeletal problems (ICPC chapter 'L') were divided into all arthritis problems (rheumatoid arthritis, osteoarthritis and unspecified arthritis) versus all other musculoskeletal problems. These broad problem categories were derived from the recommended indications for the use of Cox-2 inhibitors[31] and the problems for which NSAIDs were most often prescribed. The medication rate of NSAIDs for arthritis problems was compared with the medication rate for other musculoskeletal problems. Multiple regression was used to examine trends over time in the medication rate of NSAID for arthritis, other musculoskeletal problems and all other problems.

Figure 14.1 shows the medication rate of NSAIDs per 100 encounters unadjusted for problem type. There was an increase in NSAIDs observed between 1999-00 and 2000–01, which levelled off in 2001–02 and 2002–03. Specifically, the rate of Cox-2 inhibitors prescribed/supplied increased significantly in the period 1999–00 to 2001–02 with no further increase in 2002–03. The rate of the other NSAIDs declined from 1999–00 to 2001–02 with rates levelling off in 2002–03.



	1998–99	1999–00	2000–01	2001–02	2002–03
Cox-2 inhibitors	0.0	0.3	2.7	3.0	2.6
Other NSAIDs	5.0	4.9	4.1	3.4	3.7
Total NSAIDs	5.0	5.2	6.8	6.4	6.3

Figure 14.1: Rates of NSAIDs per 100 encounters over time

Figure 14.1 includes all NSAID medications prescribed, supplied or advised by the GP at the encounter. Table A4.9 in Appendix 4 indicates that when only prescribed medications were included there was a decrease in prescribed NSAIDs in 2002–03 relative to the previous two years. However, although non-Cox-2 inhibitors declined overall, there was an increase in the OTC rate of ibuprofen (Table A4.12 Appendix 4). The increase in NSAID OTC rates may account for the observed decline in NSAID *prescribing* over the last year, while the overall NSAID *medication* rate remained constant.

The rate of all NSAIDs prescribed, advised or supplied specifically for arthritis problems increased from around 38 medications per 100 arthritis problems in 1999–00 to 54 per 100 arthritis problems in 2000–01, with rates of medications prescribed, advised or supplied dropping slightly in 2002–03 to 50 medications per 100 arthritis problems (Figure 14.2). The increase was due to an increase in the rate of Cox–2 inhibitors from 4 per 100 arthritis problems in 1999–00 to 34 per 100 arthritis problems in 2001–02, with a slight decrease to 31 per 100 problems in 2002–03. At the same time, the rate of other NSAIDs prescribed, advised or supplied decreased from 35 per 100 arthritis problems in 1999–00 to 18 per 100 in 2001–02. This changing pattern of medication management indicates that the increase in Cox–2 inhibitors was largely responsible for an overall increase in the total NSAID medication rate for arthritis problems. The decrease in other NSAIDs indicates that there has been considerable substitution of Cox-2 inhibitors for other NSAIDs. However, the 2002–03 figures indicate that the medication rates for arthritis, including Cox-2 inhibitors have now stabilised at a new level.

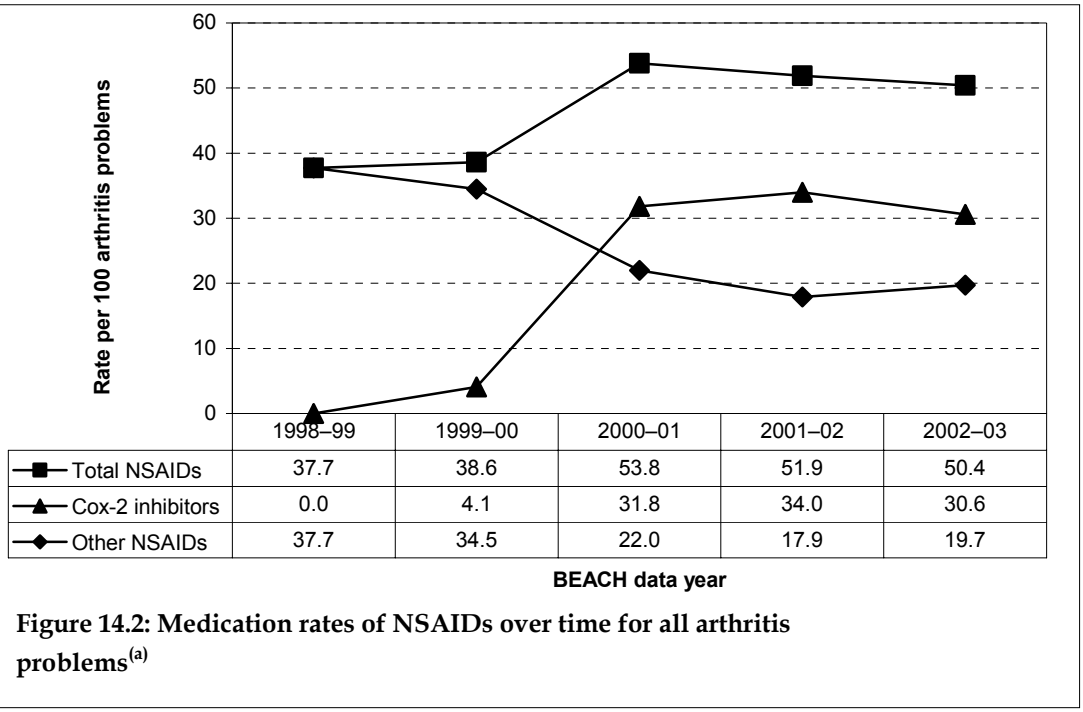


Figure 14.2: Medication rates of NSAIDs over time for all arthritis problems[(a)]

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

The medication rate of NSAIDs for musculoskeletal problems other than arthritis rose over the period 1999–00 to 2000–01, with no further increase in 2001–02 or 2002–03 (Figure 14.3). The medication rate of Cox-2 inhibitors for other musculoskeletal problems continued to increase in 2001–02, while the rate of all other NSAIDs decreased. These rates appeared to have stabilised over the most recent data period.

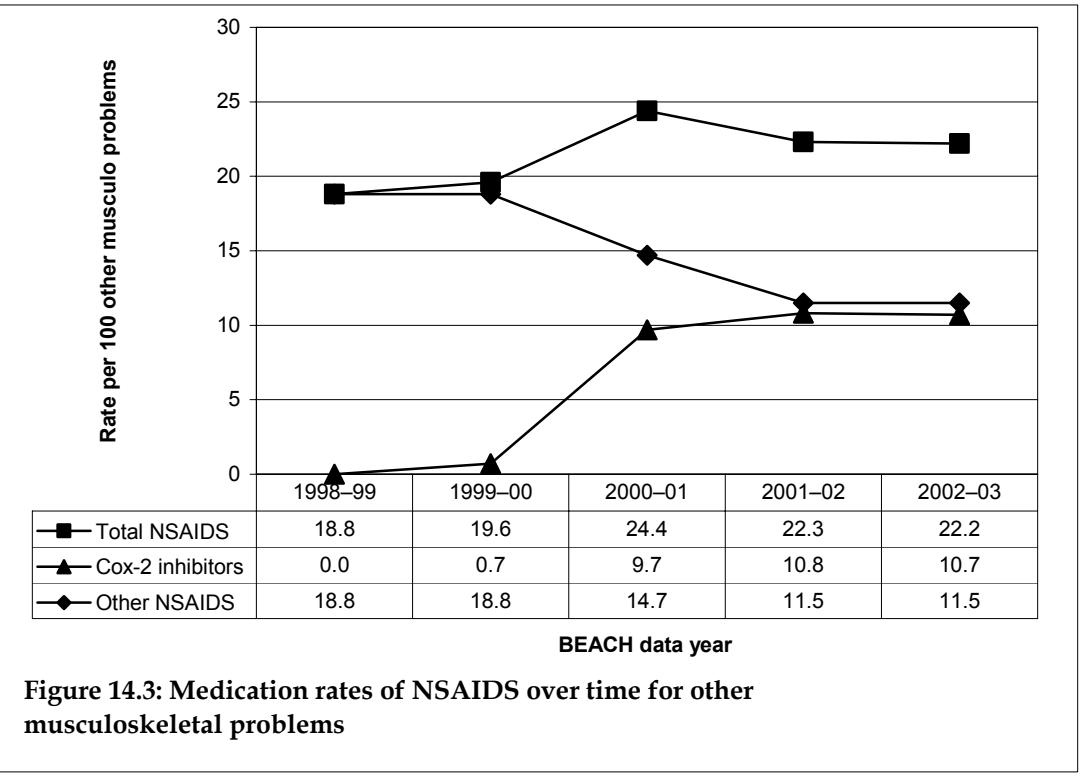


Figure 14.3: Medication rates of NSAIDS over time for other musculoskeletal problems

Multiple regression

All NSAIDs

Multiple regression, with the medication rate of total NSAIDs as the outcome, found a significant time by problem interaction for the medication rate of total NSAIDs ($p<0.0001$). This interaction indicates that since 1999–00 the increase in the medication rate of total NSAIDs has been more pronounced for arthritis problems than for other musculoskeletal problems.

Cox-2 inhibitors

Multiple regression, with the medication rate of Cox-2 inhibitors as the outcome, found a significant time by problem interaction for the medication rate of Cox-2 inhibitors ($p<0.0001$). This interaction indicates that the rate of prescribing of Cox-2 inhibitors from 1999–00 to 2002–03 was more pronounced for arthritis problems than for other musculoskeletal problems.

Other NSAIDs (not Cox-2 inhibitors)

Multiple regression, with the rate of NSAIDs other than Cox-2 inhibitors as the outcome, found a significant time by problem interaction ($p<0.0001$). This interaction indicates that, from 1999–00 to 2002–03, the decrease in the medication rate of other NSAIDs, was more pronounced for arthritis problems relative to other musculoskeletal problems.

Conclusion

From 1999–00 to 2000–01, there was a marked increase in the medication rate for total NSAIDs for both arthritis problems and other musculoskeletal problems, an increase which was entirely explained by an increase in the medication rate of Cox-2 inhibitors. There is evidence that, over the period, Cox-2 inhibitors were substituted for other NSAIDs for both arthritis problems and other musculoskeletal problems. In 2002–03 around 30% of arthritis problems and around 10% of other muskuloskelatal problems resulted in a Cox-2 inhibitor being supplied or prescribed at the encounter. However, the increase in the prescribing rate of total NSAIDs, the uptake of Cox-2 inhibitors and the discarding of other NSAIDs was significantly more pronounced for arthritis problems relative to other musculoskeletal problems. The pattern of medication rates of NSAIDs for both arthritis and other musculoskeletal problems appears to have settled in the last two years.

Current status of arthritis

Figure 14.4 is a flow chart summarising the management of arthritis in 2002–03.

Patients

The majority of patients at arthritis encounters were female, and more than 90% were aged 45 years and over.

Patient reasons for encounter: Though musculoskeletal problems were the most common reasons for encounter, a large proportion of patients requested prescriptions or tests results as a reason for encounter.

Other problems managed

There were 92.8 other problems managed per 100 arthritis encounters. Hypertension, lipid disorder, diabetes and depression were managed at arthritis encounters more frequently than average for all BEACH encounters. The older age of patients at arthritis encounters probably accounts for the higher rates of other chronic disorders managed at the encounter.

Management

Medication: Medication rates for arthritis were high at 94.7 medications per 100 problems (3,468/3,644). Taken together, the Cox-2 inhibitors were the most common medications prescribed or advised for arthritis, followed by paracetamol.

Non-pharmacological treatments: The number of non-pharmacological treatments for arthritis was relatively low; the most common were advice or education, followed by physical medicine/rehabilitation, and local injection/infiltration.

Tests and referrals: Pathology tests were ordered at a rate of 18.8 per 100 arthritis problems, imaging at 13.9 per 100 problems and referrals were made at a rate of 10.0 per 100 problems. The most common pathology tests were for chemistry and haematology. Nearly all imaging ordered for arthritis involved diagnostic radiology, and the most common referral was to an orthopaedic surgeon.

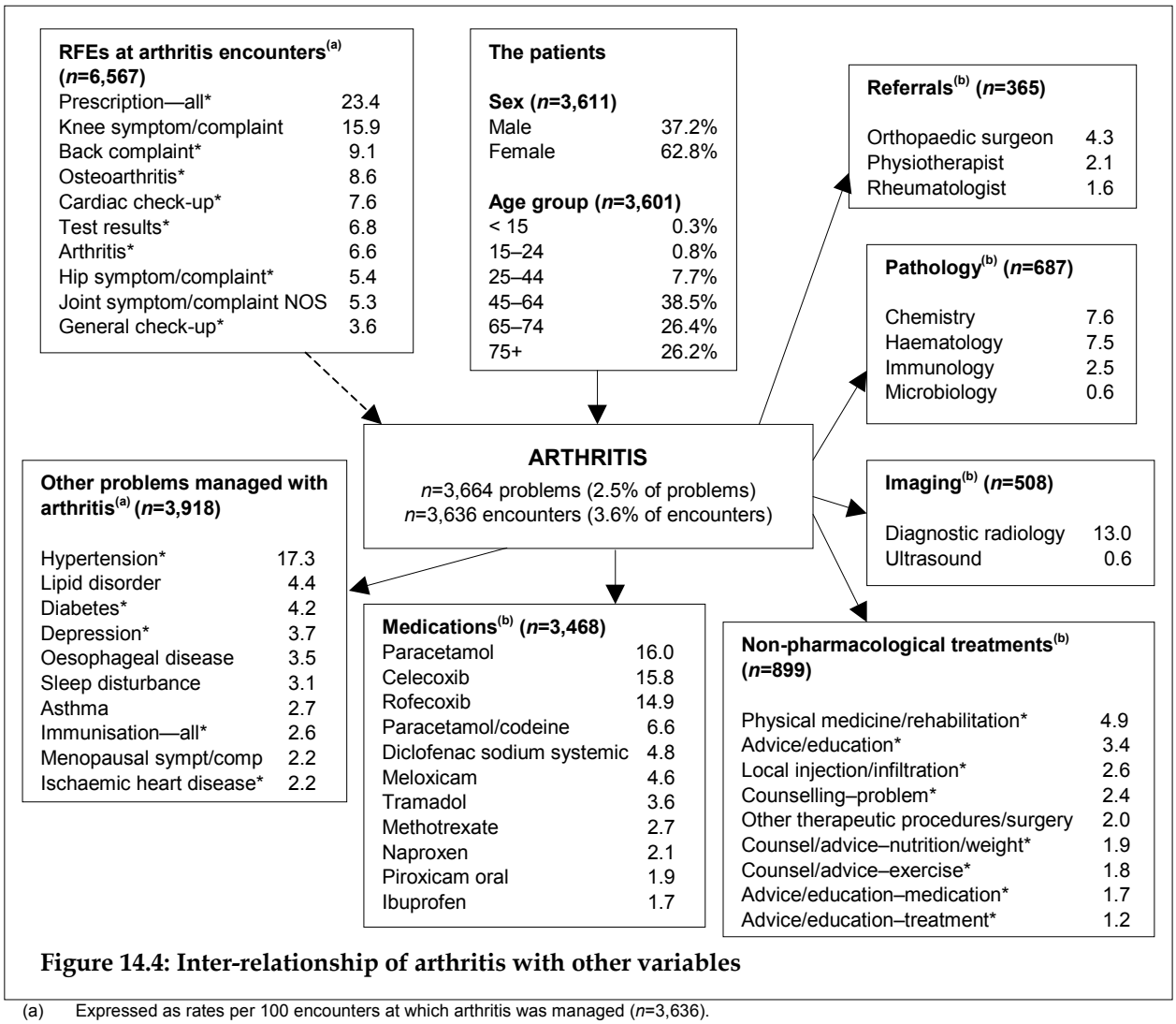


Figure 14.4: Inter-relationship of arthritis with other variables

(a) Expressed as rates per 100 encounters at which arthritis was managed (*n*=3,636).
(b) Expressed as rates per 100 problems at which arthritis was managed (*n*=3,664).
* Includes multiple ICPC–2 or ICPC–2 PLUS codes (see Appendix 3).

14.3 Antibiotics and the management of acute upper respiratory tract infection

Changes over time

Antibiotics were defined as the medications grouped in ATC code J01. Antibiotics were further subdivided into broad-spectrum penicillin, including combinations (ATC codes J01CA, J01CR), cephalosporin (J01DA), and other antibiotics (the balance of J01). Acute upper respiratory tract infection (URTI) was selected on the ICPC-2 rubric R74.

There has been no change over time in the management rate of URTI (see Figure 14.5), which has been constant at around 6 to 7 problems per 100 encounters.

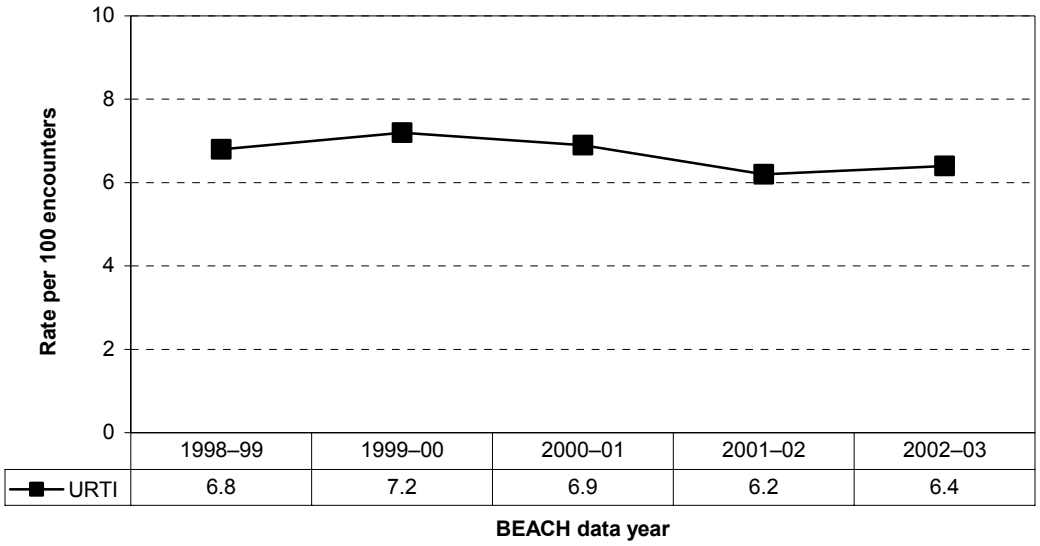
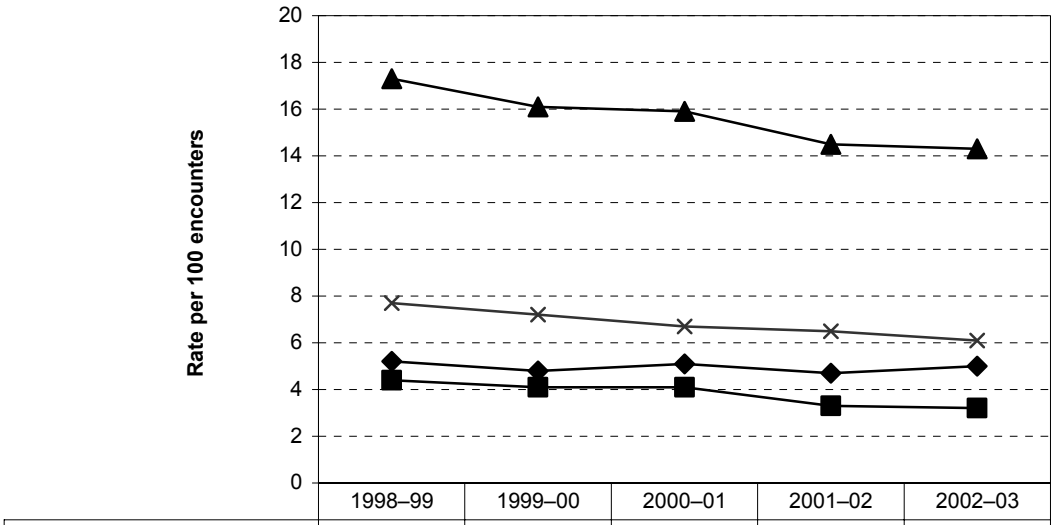


Figure 14.5: Management rate of acute upper respiratory tract infection over time

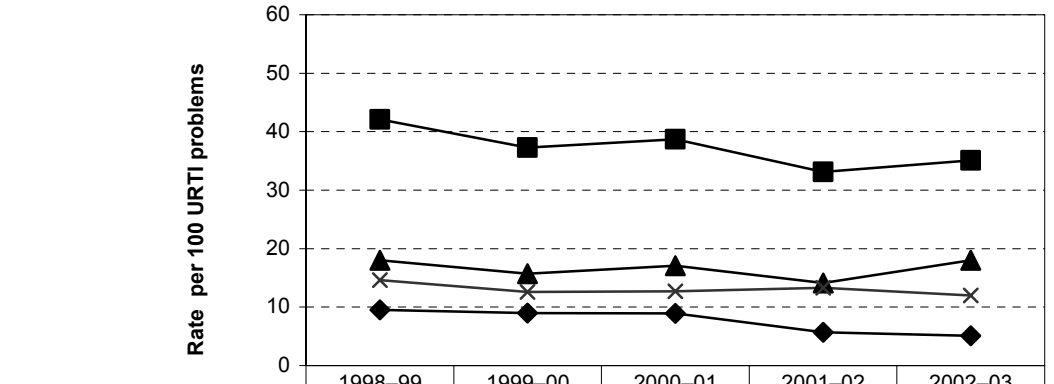
As described in Chapter 13, Section 13.3, there was a significant decrease in antibiotic medication rates per 100 encounters over time. A more detailed investigation of this decrease for particular classes of antibiotics, showed there was a significant decrease in medication rates of cephalosporins but no decrease in the medication rates of broad-spectrum penicillins (Figure 14.6).



	1998–99	1999–00	2000–01	2001–02	2002–03
antibiotics	17.3	16.1	15.9	14.5	14.3
broad-spectrum penicillin	5.2	4.8	5.1	4.7	5.0
cephalosporin	4.4	4.1	4.1	3.3	3.2
other antibiotics	7.7	7.2	6.7	6.5	6.1

BEACH data year

Figure 14.6: Rates of antibiotics per 100 encounters over time



	1998–99	1999–00	2000–01	2001–02	2002–03
antibiotics	42.1	37.3	38.7	33.1	35.1
broad spectrum penicillin	18.0	15.7	17.1	14.1	18.0
cephalosporin	9.5	9.0	8.9	5.7	5.1
other antibiotics	14.6	12.6	12.7	13.3	12.0

BEACH data year

Figure 14.7: Medication rates of antibiotics over time for all URTI problems

Multiple regression

As shown in Figure 14.7, after adjusting for URTI management, there has been a significant decrease over time in the overall rate of antibiotics prescribed or supplied for URTI ($p=0.0005$), which was reflected in a decrease in cephalosporins ($p<0.0001$). There was no change over the five year period in the rate of broad-spectrum penicillin prescribed or supplied for URTI.

The decrease seen in the medication rate for antibiotics, however, was not confined to URTI problems. URTI accounted for around 16% of antibiotics prescribed or supplied each year and accounted for 20% of the decrease in antibiotics over time.

Conclusion

There has been a general reduction in total antibiotics prescribed or supplied over the five year period, mainly explained by a decrease in antibiotics other than broad-spectrum penicillins, however, this decrease appears to have plateaued in 2002–03. There has been a decrease in antibiotic rates for URTI problems, except for broad spectrum penicillin which returned to the 1998–99 level in 2002–03. It appears that antibiotic medication rates have been reduced across a range of problems, including URTI.

Current status of acute upper respiratory infection (URTI)

Figure 14.8 is a flow chart summarising the management of upper respiratory tract infection in 2002–03.

Patients

More than half of patients at URTI encounters were female (54.5%), and just over half (52.4%) were less than 25 years old.

Reasons for encounter: The overwhelming reasons for encounter were cough, throat symptoms and acute upper respiratory symptoms, indicating that URTI symptoms were the specific reason for the encounter.

Other problems managed

The management rate of other problems was relatively low—35.6 other problems per 100 URTI encounters. After hypertension, asthma was the second most common other problem managed at URTI encounters. The low rate of other problems is explained by the younger age of patients. Because of the acute nature of URTI problems, the patient is likely to attend the encounter specifically and exclusively to deal with the URTI.

Management

Medications: There were 5,892 medications for URTI, a rate of 91.3 medications per 100 URTI problems. There were 23.5 paracetamol medications prescribed, supplied or advised per 100 URTI problems. Amoxicyllin and roxithromycin were the most common antibiotics prescribed for URTI.

Non-pharmacological treatments: The most common non-pharmacological treatments were advice and education.

Tests and referrals: There were very few other tests or referrals for URTI

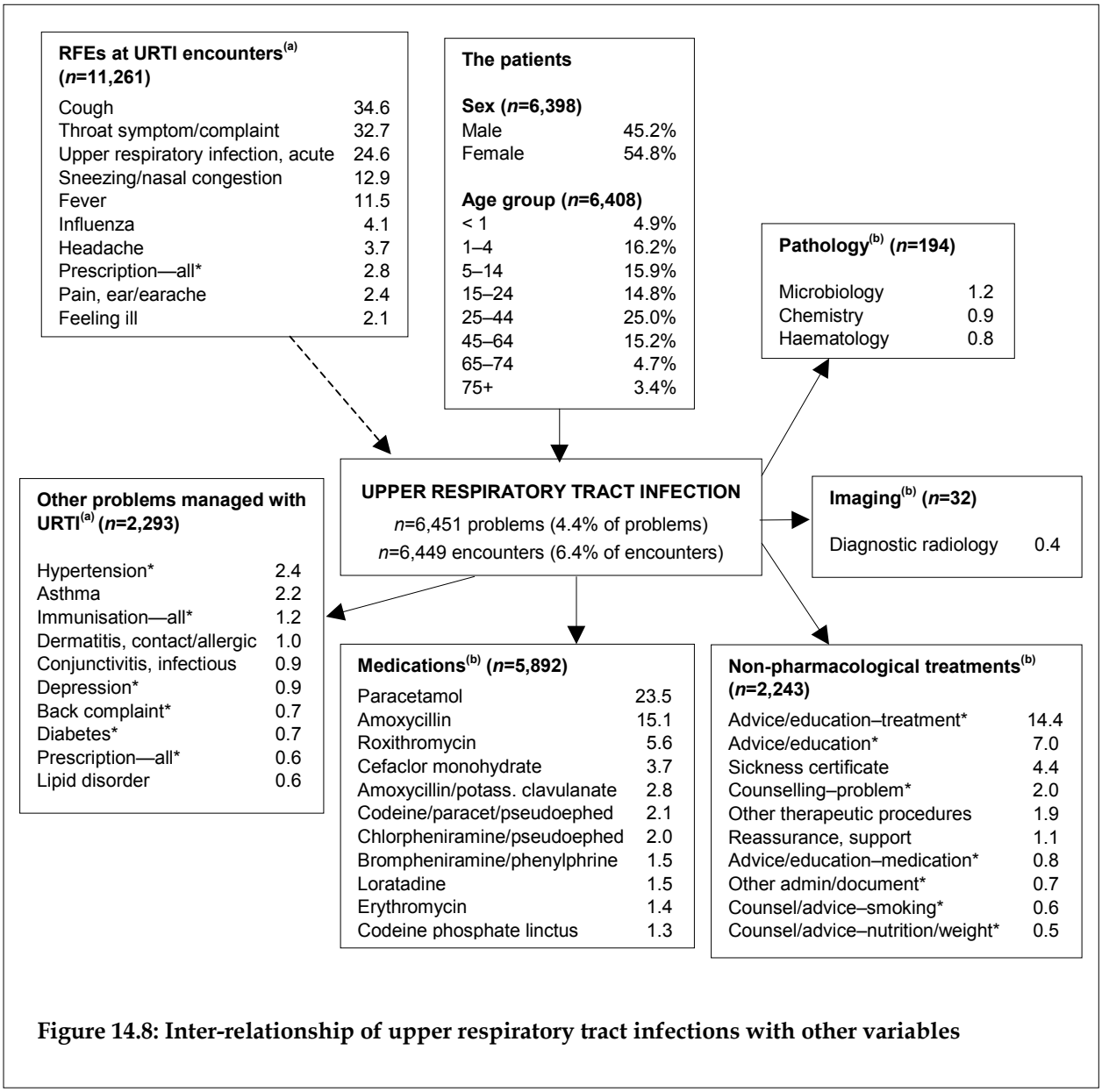


Figure 14.8: Inter-relationship of upper respiratory tract infections with other variables

(a) Expressed as rates per 100 encounters at which URTI was managed (*n*=6,451).

(b) Expressed as rates per 100 problems at which URTI was managed (*n*=6,449).

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

15 Patient risk factors

15.1 Background

General practice is commonly identified as a significant intervention point for healthcare and health promotion because general practitioners have considerable exposure to the health of the population. Approximately 85% of the population visited a GP in 2002 (personal communication, GP Branch, Australian Department of Health and Ageing DoHA). Therefore, general practice appears to provide a suitable basis from which to monitor many aspects of the health of the population.

Since April 1998 when BEACH began, a section on the bottom of each encounter form has been allocated to investigate aspects of patient health or healthcare delivery not covered by general practice consultation-based information. These additional substudies are referred to as SAND (Supplementary Analysis of Nominated Data). Organisations supporting the BEACH program have access to a subsample of 6,000 encounter forms per year in which to insert a series of questions (or two sets of questions at 3,000 encounters each) on a subject of their choice.

15.2 Methods

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

Form A contains questions about patient risk factors, including self-reported height and weight (for calculation of body mass index, BMI), alcohol consumption and smoking status.

The population risk factor questions for alcohol consumption, BMI and smoking status will remain constant in future years, and results are reported in each annual report. Abstracts of results for other topics covered in SAND are available on the Family Medicine Research Centre web site (http://www.fmrc.org.au/beach-pubs.htm#6).

15.3 Body mass index

Overweight and obesity have been estimated to account for more than 4% of the total burden of disease in Australia.[32] The 1999–2000 Australian diabetes, obesity and lifestyle study (AusDiab) estimated that 60% of Australians aged over 25 years were overweight or obese (BMI >25). Men were more likely to be overweight or obese than women (67% compared with 52%).[33]

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

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

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

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

The standard BMI calculation described above is not appropriate in the case of children. Cole et al. have developed a method which calculates the age–sex-specific BMI cut-off levels for overweight and obesity specific to children.[34] This method is based on international data from developed Western cultures and is therefore applicable within the Australian setting.

The BEACH data on BMI are presented separately for adults (aged 18 and over) and children. The standard BMI cut-offs have been applied for the adult population, and the method described by Cole et al. has been used for defining overweight and obesity in children (aged 2 to 17 years).[34] There are three categories defined for childhood BMI; underweight/normal, overweight and obese.

Body mass index of adults

BMI was calculated for 32,367 patients aged 18 years and over at encounters with 1,002 GPs. Overall, 54.7% of respondents were overweight or obese, 20.9% being defined as obese, and 33.8% were defined as overweight. A further 7.8% were underweight patients, and 37.6% were patients whose BMI was in the normal range (Table 15.1).

A significantly greater proportion of males were overweight or obese (61.4%; 95% CI: 60.3–62.5) than females (50.4%; 95% CI: 49.4–51.5). The proportion of patients considered overweight or obese was greatest for male patients aged 45–64 years (Figure 15.1). These results are consistent with those of the 1999–00 AusDiab study[33] and the results reported for BEACH 2000–01[6] and 2001–02.[24]

In the 18–24 year age group, 19.6% of women and 10.4% of men were considered underweight, as were 12.3% of women and 5.7% of men aged 75 years and over (Figure 15.2).

The BEACH results reported above are broadly consistent with the Australian Bureau of Statistics 2001 figures from the National Health Survey, of 58% overweight or obese.[35]

Table 15.1: Patient body mass index (aged 18+ years)

	Male[(a)]			Female[(a)]			Total respondents		
BMI class	**Per cent**	**95% LCL**	**95% UCL**	**Per cent**	**95% LCL**	**95% UCL**	**Per cent**	**95% LCL**	**95% UCL**
Obese	19.9	19.1	20.8	21.5	20.7	22.3	20.9	20.2	21.5
Overweight	41.5	40.5	42.4	29.0	28.2	29.7	33.8	33.2	34.5
Normal	34.6	33.5	35.6	39.5	38.5	40.4	37.6	36.8	38.3
Underweight	4.0	3.2	4.8	10.1	9.5	10.7	7.8	7.3	8.2
Total (*n*, %)	**12,450**	**100.0**	—	**19,670**	**100.0**	—	**32,367**	**100.0**	—

(a) Patient sex was unknown for 247 respondents.

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

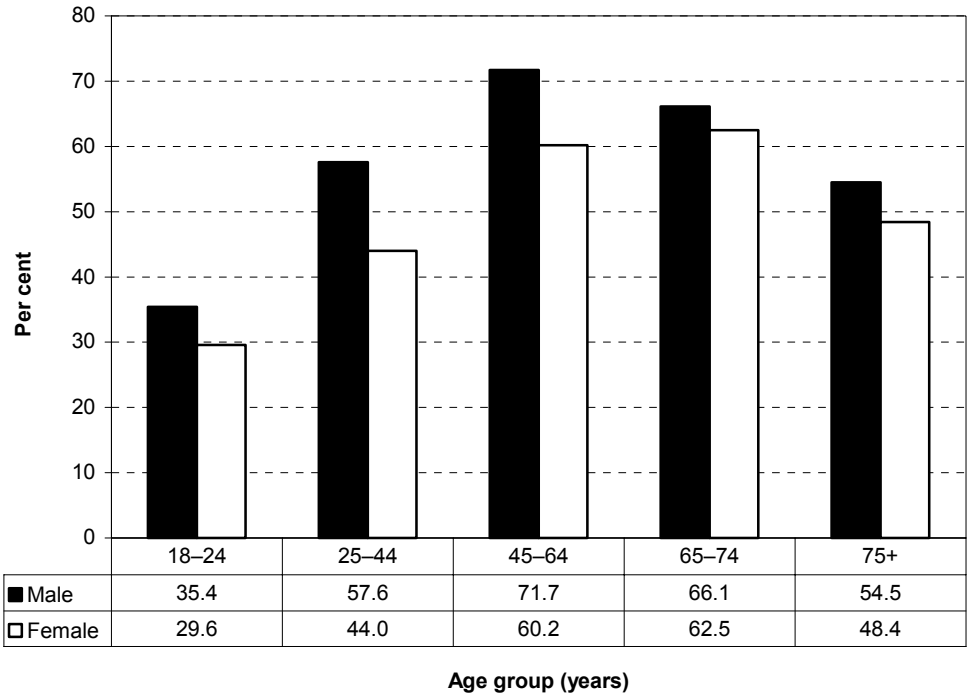


Figure 15.1: Age–sex-specific rates of overweight and obesity in adults

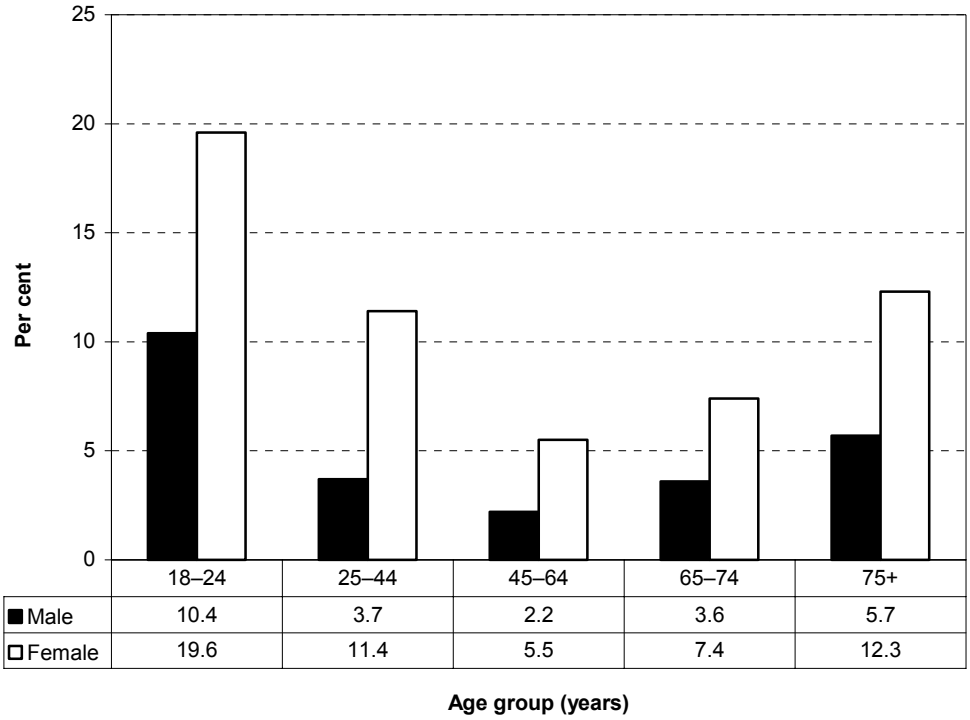


Figure 15.2: Age–sex-specific rates of underweight in adults

Body mass index of children

BMI was calculated for 3,579 patients aged between 2 and 17 years at encounters with 857 GPs. About one-third of all children aged 2 to 17 (32.1%; 95% CI: 30.1–34.2) were considered overweight or obese. Of these, 33.7% (95% CI: 30.4–37.0) were male and 31.1% (95% CI: 28.2–34.0) were female. Overall, 14.1% (95% CI: 11.4–16.8) of children were considered obese, and a further 18.1% (95% CI: 16.3–19.8) were defined as overweight (results not shown).

Being overweight or obese was most likely in the 9–12 age group (37.4%) and least likely in those aged 13–17 years (28.1%) (results not shown). Almost three-quarters of adolescent (13–17 years) females (73.3%; 95% CI: 70.6–75.9) were considered to be in the underweight/normal range, which was significantly higher than for females in this range in the 9–12 age group (65.7%; 95% CI: 61.1–70.2). A similar picture emerged for males. Male adolescents (13–17 years) were significantly more likely to be in the underweight/normal range than were males in the 9–12 age group (69.5% compared with 59.2%) (Figures 15.3 and 15.4).

It would have been interesting to compare underweight rates for pre-adolescent children (9–12 years) with those of adolescents (13–17 years). Unfortunately, we cannot identify children who are underweight from those in the normal weight range, as the method used defines cut-off levels for overweight and obesity only.[34]

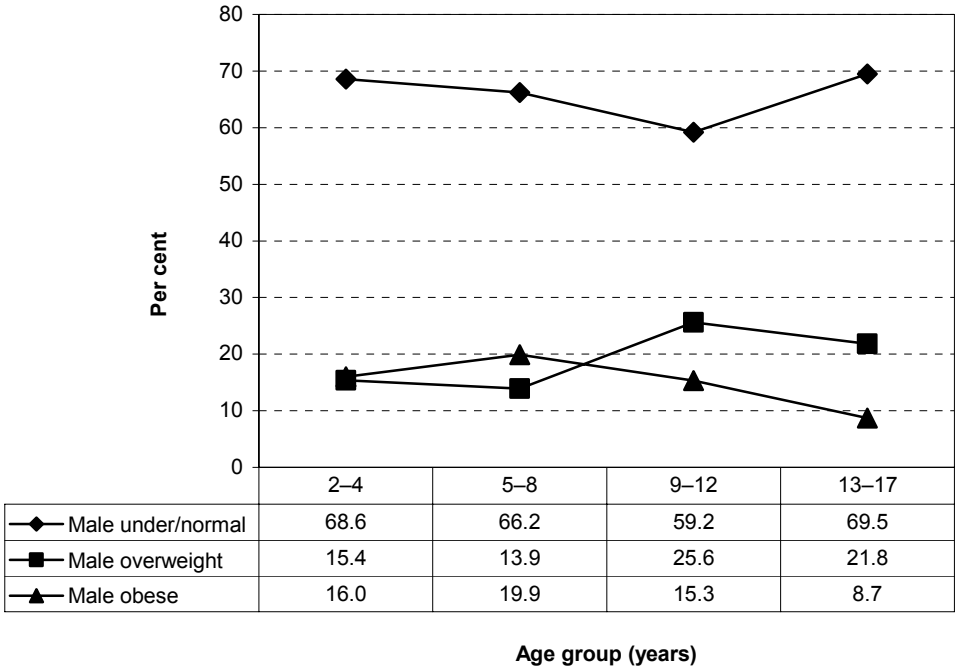


Figure 15.3: BMI in children—male age-specific rates

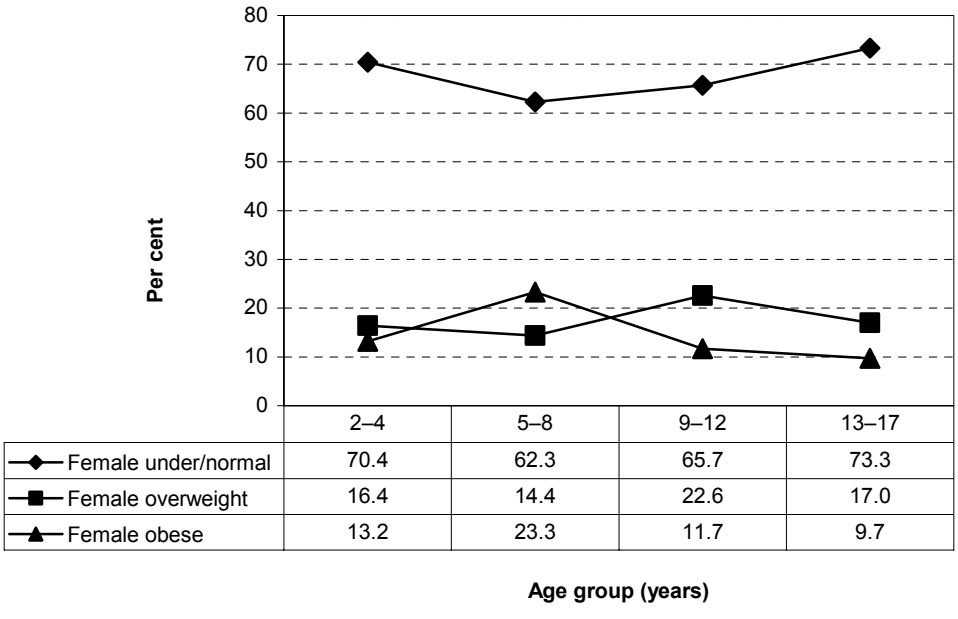


Figure 15.4: BMI in children—female age-specific rates

15.4 Smoking

Tobacco smoking is the leading cause of drug-related death and hospital separations in Australia.[36] It has been identified as the risk factor associated with the greatest disease burden, accounting for 9.7% of the total burden of disease in Australian.[32] According to the 2001 National Drug Strategy Household Survey, 19.5% of Australians aged 14 years and over smoked daily, 21.1% of males and 18.0% of females.[37]

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

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

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

The smoking status of 32,651 adult patients aged 18 years and over was established at encounters with 1,001 GPs. Overall, 17.2% of adult patients were daily smokers, 4.1% were occasional smokers, and 27.2% were previous smokers. Significantly more male patients than female patients reported being daily smokers (20.4% compared with 15.2%) (Table 15.2).

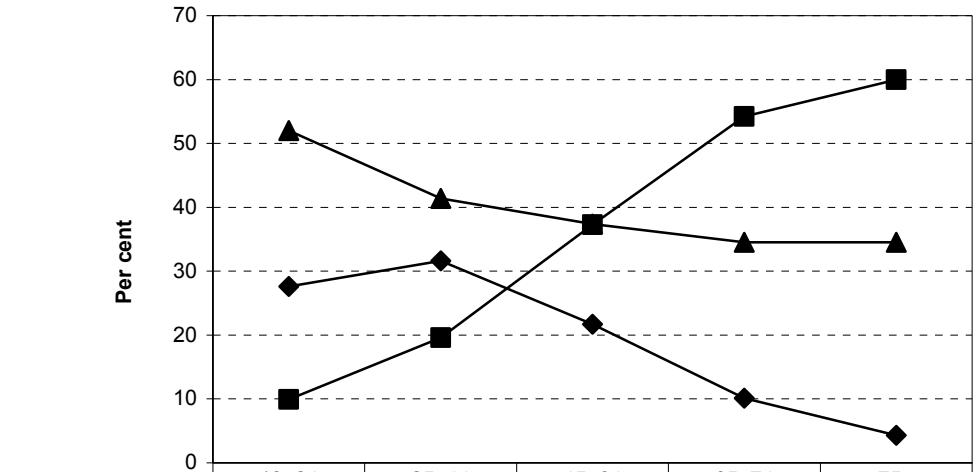
It is notable that the prevalence of daily smoking is highest among younger adult patients (aged 18–24), with 27.6% of young male and 23.7% of young female patients reporting daily smoking. The proportion of smokers decreased with age; only 4.3% of both male and female patients aged 75 years and over reported daily smoking (Figures 15.5 and 15.6). However, 60.0% of male and 24.3% of female patients aged 75 years and over stated they were previous smokers.

Table 15.2: Patient smoking status (aged 18+ years)

	Male[(a)]			Female[(a)]			Total respondents		
Smoking status	**Per cent**	**95% LCL**	**95% UCL**	**Per cent**	**95% LCL**	**95% UCL**	**Per cent**	**95% LCL**	**95% UCL**
Daily	20.4	19.4	21.4	15.2	14.4	15.9	17.2	16.5	17.9
Occasional	4.5	3.4	5.6	3.9	3.2	4.6	4.1	3.6	4.6
Previous	36.4	35.2	37.5	21.5	20.7	22.3	27.2	26.5	28.0
Never	38.7	37.5	40.0	59.4	58.3	60.5	51.4	50.4	52.4
Total (*n*, %)	**12,521**	**100.0**	—	**19,875**	**100.0**	—	**32,651**	**100.0**	—

(a) Patient sex was unknown for 255 respondents.

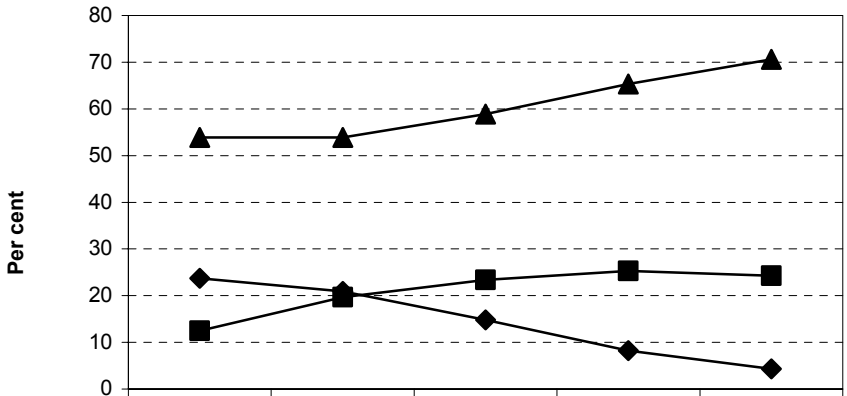
Note: LCL—lower confidence limit; UCL—upper confidence limit.



	18–24	25–44	45–64	65–74	75+
Male daily	27.6	31.6	21.7	10.1	4.3
Male previous	9.9	19.6	37.3	54.2	60.0
Male never	52.0	41.4	37.4	34.5	34.5

Age group (years)

Figure 15.5: Smoking status—male age-specific rates



	18–24	25–44	45–64	65–74	75+
Female daily	23.7	20.9	14.8	8.2	4.3
Female previous	12.5	19.7	23.4	25.3	24.3
Female never	53.9	53.9	58.9	65.3	70.6

Age group (years)

Figure 15.6: Smoking status—female age-specific rates

15.5 Alcohol consumption

In people aged 65 years and over, low to moderate consumption of alcohol has been found to have a preventative effect against selected causes of morbidity and mortality (e.g. cardiovascular disease).[36] The beneficial impact of low alcohol consumption has been found to prevent more mortality than harmful alcohol consumption causes.[36] Alcohol consumption accounted for 4.9% of the total burden of disease in Australia; however, after taking into account the benefit derived from low to moderate alcohol consumption, this fell to 2.2%.[32]

The 2001 National Drug Strategy Household Survey (NDSHS) found that 9.9% of people aged 14 years and over (10.2% of males and 9.4% of females) drank at levels considered to be risky or high risk for their health in the long term.[37] This risk level of alcohol consumption was based on the National Health and Medical Research Council 2001 Guidelines.[38] The NDSHS also found that 34.4% of people aged 14 years and above (39.3% of males and 29.6% of females) drank alcohol at levels which put their health at risk in the short term during the preceding 12 months.[37]

To measure alcohol consumption, BEACH uses three items from the WHO Alcohol Use Disorders Identification Test (AUDIT),[39] with scoring for an Australian setting.[40] Together, these three questions assess 'at-risk' alcohol consumption. The scores for each question range from zero to four. A total (sum of all three questions) score of five or more for males or four or more for females suggests that the person's drinking level is placing him or her at risk.[40]

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/fortnight
  2–3 times a week
  4+ 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
  Less than monthly
  Monthly
  Weekly
  Daily or almost daily

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

The wording of the responses to the first and third questions were changed from 2001–02 onwards to reflect exactly the AUDIT instrument from which they are derived. This update, along with a data entry change enabling more specific entry for the second question slightly increased the rates of 'at-risk' drinking reported for the fourth and fifth years (2001–02 and 2002–03) compared with the first three years of the program. The data collected in 2001–02 and 2002–03 are a more accurate reflection of the alcohol consumption in general practice patients.

Responses to these questions were recorded at 32,140 patient encounters (18+ years) from 1,001 GPs. Overall, 26.2% of patients reported drinking alcohol at risk levels. The proportion of 'at-risk' drinkers was higher for male patients than for female patients (32.9% compared with 22.1%) (Table 15.3).

The highest proportion of 'at-risk' drinkers was in the 18–24 age group where almost half of the males (44.4%) and more than a third of females (35.7%) reported 'at-risk' alcohol consumption. The proportion of patients who were 'at-risk' drinkers decreased with age for both males and females (Figure 15.7).

These estimates are a little lower than those made from the NDSHS.[37] This is likely to be due to the difference in the age ranges studied (14 + in NDSHS and 18+ in BEACH), and to differences in the age–sex distributions of the study populations. As older people attend the GP more frequently than young adults, they have a greater chance of being selected in the subsample and this leads to a greater proportion of older people, the group less likely to report drinking alcohol at 'at-risk' levels.

Table 15.3: Patient alcohol consumption (aged 18+ years)

	Male			Female			Total respondents		
Alcohol consumption	**Per cent**	**95% LCL**	**95% UCL**	**Per cent**	**95% LCL**	**95% UCL**	**Per cent**	**95% LCL**	**95% UCL**
'At-risk' drinker	32.9	31.6	34.1	22.1	21.2	23.0	26.2	25.4	27.1
Responsible drinker	46.7	45.5	47.8	42.7	41.7	43.8	44.2	43.4	45.1
Non-drinker	20.5	19.5	21.6	35.2	33.9	36.5	29.5	28.5	30.6
Total (*n*, %)	**12,521**	**100.0**	—	**19,875**	**100.0**	—	**32,140**	**100.0**	—

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

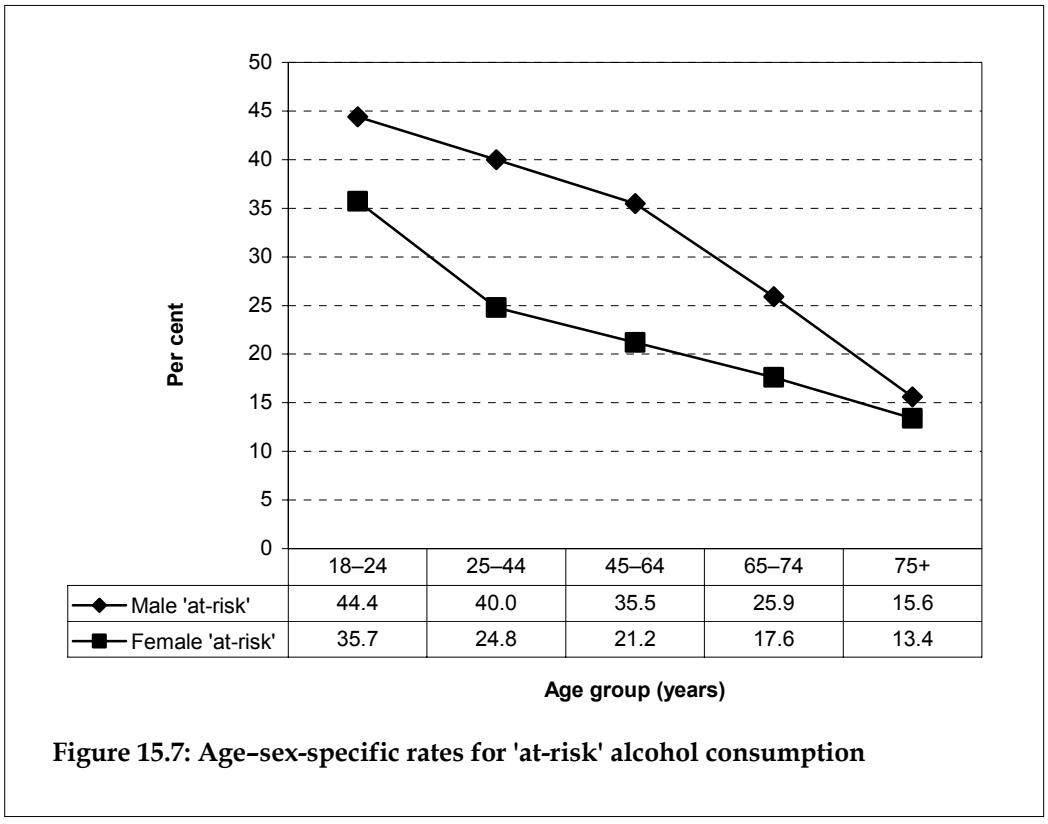


Figure 15.7: Age–sex-specific rates for 'at-risk' alcohol consumption

15.6 Risk factor profile of adult patients

From 2001–02 onwards, all patient risk factor questions (BMI, smoking and alcohol consumption) were asked of the same subsample of patients, making it possible to build up a risk profile of this sample of adult patients. For the purposes of this analysis, being overweight or obese, a daily smoker or an 'at-risk' drinker are considered to be risk factors.

A risk factor profile was prepared for 31,152 adult patients (aged 18 or more). Of the three measured risk factors, almost half of adult patients (48.2%) had one risk factor. Being overweight or obese accounted for almost three-quarters of these single risk factor patients (73.5%). One in five patients (19.6%) had two risk factors. The three most common combinations when a patient had two risk factors all involved drinking at risk levels. 'At-risk' alcohol consumption in combination with being overweight was most common (34.5%) followed by obesity (19.9%) then daily smoking (19.8%). A small minority (3.6%) of patients reported having all three risk factors (Table 15.4).

Overall, female patients reported significantly lower levels of risk factors than males. Almost a third of females (32.6%) reported not having any of the measured risk factors, compared with 22.3% of males. Half of females (49.4%) had only one risk factor compared with 46.2% of males (Table 15.5)

Table 15.4: Risk factor profile of patients (aged 18+ years)

Number of risk factors	Number	Per cent of patients (*n*=31,152)	95% LCL	95% UCL
None	**8,912**	**28.6**	**27.7**	**29.5**
One	**14,999**	**48.2**	**47.5**	**48.8**
Overweight only	6,774	21.7	21.1	22.3
Obese only	4,254	13.7	13.1	14.2
Current daily smoker only	1,400	4.5	4.1	4.9
'At-risk' alcohol level only	2,571	8.3	7.7	8.8
Two	**6,109**	**19.6**	**19.0**	**20.2**
Overweight and current daily smoker	948	3.0	2.7	3.4
Obese and current daily smoker	627	2.0	1.6	2.4
Overweight and 'at-risk' alcohol level	2,105	6.8	6.4	7.1
Obese and 'at-risk' alcohol level	1,217	3.9	3.6	4.2
Daily smoker and 'at-risk' alcohol level	1,212	3.9	3.5	4.3
Three	**1,132**	**3.6**	**3.3**	**4.0**
Overweight and current daily smoker and 'at-risk' alcohol level	728	2.3	2.0	2.7
Obese and current daily smoker and 'at-risk' alcohol level	404	1.3	0.9	1.7

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

Table 15.5: Number of risk factors, by patient sex

Number of risk factors	Number	Per cent of patients	95% LCL	95% UCL
Male patients	**12,058**	**100.0**	—	—
Zero	2,693	22.3	21.3	23.3
One	5,570	46.2	45.2	47.1
Two	3,123	25.9	25.0	26.8
Three	672	5.6	4.9	6.3
Female patients	**19,094**	**100.0**	—	—
Zero	6,219	32.6	31.5	33.6
One	9,429	49.4	48.5	50.3
Two	2,986	15.6	15.0	16.3
Three	460	2.4	1.7	3.1
Total patients	**31,152**	—	—	—

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

15.7 Changes from 1998–99 to 2002–03

The proportion of adults classified as obese according to their self-reported height and weight showed a significant increase over the five years (18.4% in 1998–99 compared with 20.9% in 2002–03). However, the proportion classed as obese appears fairly constant in 2001–02 (21.4%) and 2002–03 (20.9%). Rates of overweight were fairly stable over the five years. In 1998–99, 51.2% of patients were overweight or obese, compared with 54.7% in 2002–03 (Table 15.6). The increase in obese patients over the period corresponds with a significant decrease in patients of normal weight from 40.3% in 1998–98 to 37.6% in 2002–03.

The proportion of adults attending general practice who reported being daily smokers in 2002–03 (17.2%) was significantly lower than the first three years of BEACH, 1998–99, 1999–00 and 2000–01 (19.2%, 18.9% and 19.3% respectively).

The proportion of adult patients consuming 'at-risk' levels of alcohol was similar for the first three years of BEACH, and then slightly greater but consistent in 2001–02 and 2002–03, due to a slight change in the scoring method.

Table 15.6: Comparative results for patient risk factors, 1998–99 to 2002–03

	1998–99	1999–00	2000–01	2001–02	2002–03
Risk factor	**Per cent (95% CI)**	**Per cent (95% CI)**	**Per cent (95% CI)**	**Per cent (95% CI)**	**Per cent (95% CI)**
Obese	18.4 (17.7–18.9)	19.4 (18.8–20.0)	20.2 (19.5–20.8)	21.4 (20.7–22.1)	20.9 (20.2–21.5)
Overweight	32.8 (32.1–33.4)	33.1 (32.5–33.8)	34.1 (33.4–34.7)	33.5 (32.9–34.1	33.8 (33.2–34.5)
Current daily smoker	19.2 (18.4–20.0)	18.9 (18.2–19.6)	19.3 (18.5–20.1)	18.4 (17.7–19.1)	17.2 (16.5–17.9)
'At-risk' alcohol level	24.5 (23.6–25.3)	24.2 (23.4–24.9)	24.1 (23.3–24.9)	26.0 (25.1–26.8)	26.2 (25.4–27.1)

Note: CI—confidence interval.