

2 Methods

In summary:

- each year BEACH involves a random sample of approximately 1,000 GPs
- each GP records details about 100 doctor-patient encounters of all types
- the GP sample is a rolling (ever-changing) sample, with approximately 20 GPs participating in any one week, 50 weeks a year
- each GP can be selected only once per quality assurance (QA) triennium (that is once every 3 years)
- the encounter information is recorded by the GPs on structured paper encounter forms (Appendix 1)
- each GP participant also completes a questionnaire about themselves and their practice (Appendix 2).

2.1 Sampling methods

The source population includes all vocationally registered GPs and all general practice registrars who claimed a minimum of 375 general practice A1 Medicare items in the most recently available 3-month Medicare data period (which equates to 1,500 A1 Medicare claims a year). This ensures inclusion of the majority of part-time GPs while excluding those who are not in private practice but claim for a few consultations a year.

On a quarterly basis the Primary and Ambulatory Care Division of the Department of Health and Ageing (DoHA) updates the sample frame from the Medicare records, leaving out of the sample frame any GPs already randomly sampled in the current triennium, and draws a new sample from those currently in the sample frame. This ensures the timely addition of new entries to the profession, and timely exclusion of those GPs who have stopped practising.

2.2 Recruitment methods

The randomly selected GPs are approached by letter posted to the address provided by DoHA.

- Over the following 10 days the telephone numbers generated from the Medicare data are checked using the electronic white and yellow pages. This is necessary because many of the telephone numbers provided from the Medicare data are incorrect.
- The GPs are then telephoned in the order they were approached and, referring to the approach letter, asked whether they will participate.
- This initial telephone contact with the practice often indicates that the selected GP has moved elsewhere, but is still in practice. Where the new address and/or telephone number can be obtained, these GPs are followed up at their new address.
- GPs who agree to participate are set an agreed recording date several weeks ahead.
- A research pack is sent to each participant about 10 days before the planned start date.

- Each GP receives a telephone reminder in the first days of the agreed recording period – this also provides the GP with an opportunity to ask questions about the recording process.
- GPs can use a ‘freecall’ (1800) number to ring the research team with any questions during their recording period.
- Non-returns are followed up by regular telephone calls for up to 3 months after the set recording time.
- Participating GPs earn Clinical Audit points towards their QA requirements through the Royal Australian College of General Practitioners (RACGP). As part of this QA process, each receives an analysis of his or her results compared with those of nine other de-identified GPs who recorded at approximately the same time. Comparisons with the national average and with targets relating to the National Health Priority Areas are also provided. In addition, GPs receive some educational material related to the identification and management of patients who smoke or consume alcohol at hazardous levels. Additional points can be earned if the participant chooses to do a follow-up audit of smoking and alcohol consumption among a sample of patients about 6 months later.

2.3 Data elements

BEACH includes three interrelated data collections: encounter data, GP characteristics and patient health status. An example of the form used to collect the encounter data and the data on patient health status in 2008–09 is included in Appendix 1. The GP characteristics questionnaire (2008–09) is provided in Appendix 2. The data collected include the following:

- **Encounter data:** date of consultation, type of consultation (direct/indirect), up to three MBS/DVA item numbers (where applicable) and other payment source (where applicable) (tick boxes).
- **Patient data:** date of birth, sex and postcode of residence. Tick boxes are provided for Commonwealth concession cardholder, holder of a Repatriation health card (from DVA), non-English-speaking background (patient self-report – a language other than English is the primary language at home), Aboriginal person (self-identification) and Torres Strait Islander person (self-identification). Space is provided for up to three patient reasons for encounter (RFEs).
- **The problems managed** at encounter (at least one and up to four). Tick boxes are provided to denote the status of each problem as new or continuing for the patient
- **Management** of each problem, including:
 - medications prescribed, supplied by the GP and advised for over-the-counter purchase including brand name, form (where required), strength, regimen, status (if new or continuing medication for this problem for this patient) and number of repeats
 - other treatments provided for each problem including counselling, advice and education, and procedures undertaken; and if other treatment was provided by practice nurse (tick box)
 - new referrals to medical specialists, allied health professionals and hospital
 - investigations including pathology tests, imaging and other investigations ordered at the encounter.

- **GP characteristics:** age and sex, years in general practice, number of GP sessions worked per week, number of full-time equivalent GPs working in the practice, postcode of major practice address, country of graduation, postgraduate general practice training and Fellow of the RACGP status, after-hours care arrangements, use of computers in the practice, whether the practice is accredited, whether it is a teaching practice, work undertaken in other clinical settings and hours worked in direct patient care.

2.4 The BEACH relational database

The BEACH relational database is described diagrammatically in Figure 2.1.

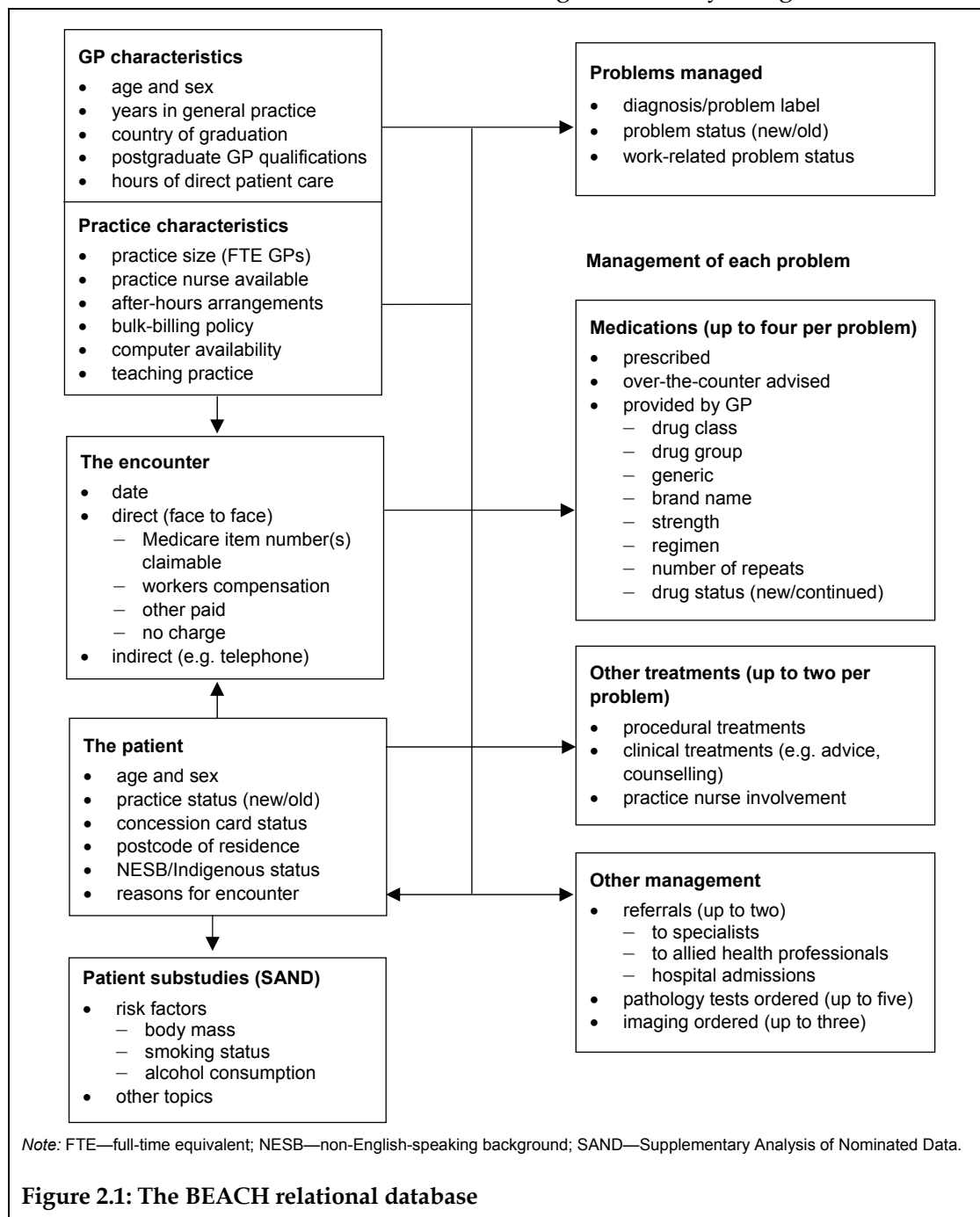


Figure 2.1: The BEACH relational database

Note that:

- all variables can be directly related to GP and patient characteristics, and to the encounter
- RFEs have only an indirect relationship with problems managed, as a patient may describe one RFE (such as 'repeat prescriptions') that is related to multiple problems managed, or several RFEs (such as 'runny nose' and 'cough') that relate to a single problem (such as upper respiratory tract infection) managed at the encounter
- all types of management are directly related to the problem being treated.

2.5 Supplementary Analysis of Nominated Data

A section at the bottom of each recording form investigates aspects of patient health or health care delivery in general practice not covered by the consultation-based data. These additional substudies are known as Supplementary Analysis of Nominated Data (SAND).

- The year-long data period is divided into 10 blocks, each of 5 weeks with three substudies per block. The research team aims to include data from about 100 GPs in each block.
- Each GP's pack of 100 forms is made up of 40 forms that ask for the start and finish times of the encounter, and include questions about patient risk factors, patient height and weight (used to calculate body mass index (BMI)), alcohol intake and smoking status (patient self-report). The results of topics in the SAND substudies for alcohol consumption, smoking status and BMI are reported in Chapter 14. The start and finish times collected on these encounters is used to calculate the length of consultation. The length of consultation for Medicare-claimable encounters is reported in Chapter 5.
- The remaining 60 forms in each pack are divided into two blocks of 30. Different questions are asked of the patient in each block and these vary throughout the year.
- The order of SAND sections is rotated in the GP recording pack, so that 40 patient risk factor forms may appear first, second or third in the pad. Rotation of ordering ensures there was no order effect on the quality of the information collected.

Abstracts of results and the research tools used in all SAND substudies from April 1998 to March 2009 have been published. Those from:

- April 1998–99 were published in *Measures of health and health care delivery in general practice in Australia*¹¹
- April 1999 to July 2006 were published in *Patient-based substudies from BEACH: abstracts and research tools 1999–2006*¹²
- August 2006 to March 2007 were published in *General practice activity in Australia 2006–07*¹³
- April 2007 to January 2008 were published in *General practice activity in Australia 2007–08*¹⁰
- February 2008 to January 2009 are included in Chapter 15 of *General practice activity in Australia 2008–09*.¹

Abstracts of results for all SAND substudies are also available on the FMRC's website <www.fmrc.org.au/publications/SAND_abstracts.htm>.

Patient risk factor substudy methods

Body mass index

Patient BMI was investigated for a subsample of 40 of the 100 patient encounters. Each GP was instructed to ask the patient (or their carer in the case of children):

- What is your height in centimetres (without shoes)?
- What is your weight in kilograms (unclothed)?

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

The BMI for an individual was calculated by dividing weight (kilograms) by height (metres) squared. The recent World Health Organization (WHO) recommendations¹⁴ for BMI groups were used, which specify that an adult (18 years and over) with a BMI:

- less than 18.5 is underweight
- greater than or equal to 18.5 and less than 25 is normal
- greater than or equal to 25 and less than 30 is overweight
- of 30 or more is obese.

The reported height for adult patients was checked against sex-appropriate upper and lower height limits from the Australian Bureau of Statistics (ABS).¹⁵ Encounters with adults whose reported heights were outside the sex-appropriate limits were excluded from the analysis.

The division between underweight and normal was, in reports published before 2006, set at a BMI of 20. In tables 14.1 to 14.3 patient BMI have been recalculated for all years and are reported according to the current WHO criteria.

The standard BMI cut-offs described above are not appropriate in the case of children. Cole et al. (2000, 2007) developed a method which calculates the age-sex-specific BMI cut-off levels for overweight and obesity specific to children aged 2-17 years.^{16,17} This method, based on international data from developed Western cultures, is applicable in the Australian setting. The reported height of children was checked against age-sex-appropriate upper and lower height limits from the ABS and Centres for Disease Control (CDC).^{15,18} Encounters with children whose reported heights were outside either of the age-sex-appropriate limits were excluded from the analysis. In reports published prior to 2009 the BMI categories of underweight and normal were grouped together for children. In Table 14.1 the BMI have been recalculated for all years for children.

The BEACH data on BMI are presented separately for adults (aged 18 years and over) and children (aged 2-17 years). The standard BMI cut-offs have been applied for the adult sample, and the method described by Cole et al. (2000, 2007) has been used for defining overweight and obesity in children (aged 2-17 years).^{16,17}

Smoking

GPs were instructed to ask adult patients (18 years and over):

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

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

Alcohol consumption

To measure alcohol consumption, BEACH uses three items from the WHO Alcohol Use Disorders Identification Test (AUDIT)¹⁹, with scoring for an Australian setting.²⁰ 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.²⁰

GPs were instructed to ask adult patients (18 years and over):

- 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 six 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.

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

The wording of the responses to the first and third questions was changed from 2001-02 onwards to reflect exactly the AUDIT instrument from which the responses 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. The data collected from 2001-02 onwards are a more accurate reflection of the alcohol consumption of general practice patients and these are the years compared in this report.

2.6 Statistical methods

The analysis of all BEACH data was conducted with Statistical Analysis System (SAS) version 9.1.3.²¹ When originally published, data from 1999–00 to 2004–05 were analysed using SAS version 6.12²² (with additional programming to adjust for the cluster sample study design). In this report (and others published since 2007) these data have been re-analysed using SAS version 9.1.3 (which adjusts for the cluster design without the need for additional programming). This has resulted in slightly tighter confidence intervals and minor variations in point estimates (of up to 0.1) when compared with data published in earlier annual reports for the 1998–04 data years.

BEACH is a single stage cluster sample study design, each 100 encounters forming a cluster around each GP participant. In cluster samples, variance needs to be adjusted to account for the correlation between observations within clusters. Procedures in SAS version 9.1.3 are used to calculate the intracluster correlation and adjust the confidence intervals accordingly.²¹

Post-stratification weighting of encounter data adjusts for any variance in the characteristics of the participating GPs from those of the sample frame from which they were drawn, and for the varying activity level of each GP (measured by the number of claims each has made in the previous 12 months from Medicare Australia). The final sample of encounters shows excellent precision when the age–sex distribution of the patients is compared with the distribution in all Medicare-claimed services of this type.¹

The encounter is the primary unit of inference. Proportions (%) are used when describing the distribution of an event that can arise only once at a consultation (for example, age, sex), or to describe the distribution of events within a class of events (for example, problem A as a percentage of total problems). Rates per 100 encounters are used when an event can occur more than once at the consultation (for example, RFEs, problems managed or medications).

Rates per 100 problems are also used when a management event can occur more than once per problem managed. In general, the results present the number of observations (n), the rate per 100 encounters and the 95% confidence interval.

The statistical significance of changes in characteristics of the GPs is tested using the chi-square test statistic. However, in general, the results for events occurring at GP–patient encounters present the rate per 100 encounters and the 95% confidence interval.

- Changes over time, in the frequency of these events are judged significant (that is, a real change has occurred) if the two sets of confidence intervals do not overlap. For example, Result A: 11.5 per 100 encounters (95% CI: 11.3–11.7) is significantly less than Result B: 11.9 per 100 encounters (95% CI: 11.8–12.0).
- If the two sets of confidence intervals butt together the difference is regarded as marginal. For example, Result A: 11.5 per 100 encounters (95% CI: 11.3–11.7) is marginally lower than Result B: 11.9 (95% CI: 11.7–12.1).
- If they overlap, then no change has been measured.

2.7 Changes over time

While in this report SAS version 9.1.3²¹ was used for all analyses, changes in method or approach have occurred on occasion over the 10 years of results. Data presented in this report are comparable for each result across all data years. Where methodological changes have occurred, the data have either:

- been recalculated using the new method (for example, body mass index was recalculated due to a change in the World Health Organization body mass index groupings)
- been regrouped for comparability (where this occurs, it is has been noted in the footnotes of the table)
- been omitted from this report (if recalculation or grouping was not possible). Where data are omitted, this is noted as not applicable (N/A) or not available (NAv), as appropriate.

Readers should be aware that there may be discrepancies between data in this report and data published in earlier BEACH reports.

In measuring changes over time, the 2008–09 results are compared with those from 1999–00 wherever possible. However, as in any long-term research program, changes occur over the years. For example, in response to requests from DoHA (then the Department of Health and Aged Care), more detailed coding systems for pharmaceuticals, pathology and imaging test orders were developed, and these were applied from year 3 (2000–01) onwards. In these cases, change is measured from 2000–01 because earlier years are not comparable. Practice nurse activity data were not collected until 2005–06, so the changes are only considered between 2005–06 and 2008–09.

Each table includes the most frequent events occurring in 2008–09 and the comparative results for each of the earlier years have been provided. In addition, each table includes data for events that were more frequent in past year(s) that are no longer as frequent in 2008–09. All results are presented in decreasing order of frequency by the 2008–09 data.

The direction and type of change between 1999–00 (or 2000–01 where appropriate) and 2008–09 is indicated for each result in the far right column of the tables:

- \uparrow/\downarrow indicates a statistically significant linear change
- \uparrow/\downarrow indicates a marginally significant linear change
- § indicates a non-linear significant or marginal change
- – indicates there was no change.

2.8 Extrapolated national estimates

Extrapolations can be used to estimate the number of GP encounters in Australia involving a selected event at a single time point or to estimate the total national effect of changes.

Where the results demonstrate a significant change over time, the estimated national change across total GP Medicare services from 1999–00 (or where appropriate 2000–01) to 2008–09 can be calculated using the method detailed below. An example of an extrapolated national change is given in each chapter in the report from chapters 5 to 13 inclusive.

- The national estimates are calculated by dividing the rate per 100 encounters of the selected event for 1999–00 (or 2000–01 where appropriate) by 100, and then multiplying by the total number of GP services claimed through Medicare in that year (rounded to

the nearest 100,000, see Table 2.1) to give the estimated annual number of events in 1999–00 (or 2000–01). The process is then repeated for 2008–09. The difference between the two estimates (to the nearest 10,000) gives the estimated national change in the rate of encounters for that event over the period of interest.

- This is expressed as the estimated increase or decrease over the study period (between 1999–00 or 2000–01 and 2008–09), in the number of general practice contacts for that event. For example, an increase or decrease in the number of GP management contacts with problem X occurring in Australia in 2008–09 when compared with 1999–00 (or 2000–01).

Table 2.1 provides the total number of general practice professional service items claimed from Medicare in each financial year from 1999–00 to 2008–09. In this report extrapolations are calculated using the number of GP Medicare items claimed rounded to the nearest 100,000. The rounded number is also provided in Table 2.1. Readers can use the method described above to calculate the national effect of any significant change in a single result over any two time points. Extrapolations can also be made using data from a single time point to estimate the number of GP encounters in Australia in a specific year that involve a selected event.

Example of extrapolation

A significant increase in the number of problems managed at encounter (Chapter 7), from 146.7 per 100 encounters in 1999–00 to 154.6 in 2008–09:

- $(146.7/100) \times 101.5 \text{ million} = 148.9 \text{ million}$ problems managed in general practice nationally in 1999–00, and $(154.6/100) \times 112.3 \text{ million} = 173.6 \text{ million}$ problems managed in 2008–09.

This suggests there were 24.7 million (173.6 million minus 148.9 million) more problems managed at GP encounters in Australia in 2008–09 than in 1999–00.

Table 2.1: Number of general practice professional services claimed from Medicare Australia each financial year, 1999–00 to 2008–09 ('000)

	1999–00	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09 ^(a)
Number of GP MBS items	101,517	100,645	99,921	96,919	96,330	98,180	101,095	103,433	109,518	112,275
Rounded no. of GP MBS items	101,500	100,600	99,900	96,900	96,300	98,200	101,100	103,400	109,500	112,300

(a) Medicare data for the 2008–09 year included data from the March 2008 to April 2009 quarters because the 2008–09 financial year data were not available at the time of preparation of this report.

Source: Medicare statistics, Table B1 – Medicare: Number of services ('000) by quarter and financial year of processing by broad type of service. Available at <www.health.gov.au/internet/main/publishing.nsf/Content/Medicare+Statistics-1>.

Limitations of extrapolations

The extrapolations to the total encounters occurring nationally in any one year are only estimates. They are likely to provide:

- an underestimate of the true 'GP workload' of a condition/treatment because the extrapolations are made to GP Medicare items claimed, not to the total number of GP encounters per year (approximately 5% of BEACH encounters annually which include indirect encounters and those paid by sources other than Medicare, such as DVA, state governments, work cover, employers)

- an overestimate of the management rate of a group of conditions (for example, cardiovascular disease) because there is a chance that more than one problem of this type will be managed at a single encounter. In the extrapolations, two cardiovascular problems managed at one encounter will be counted as two encounters.

Further, the base numbers used in the extrapolations are rounded to the nearest 100,000 and extrapolation estimates are rounded to the nearest 100,000 if more than a million and to the nearest 10,000 if below a million. However, the rounding has been applied to all years, so the effect on measures of change will be very small. The extrapolations therefore still provide an indication of the size of the effect of measured change nationally.

2.9 Changes to data elements and reporting methods

Changes in data elements and reporting methods have occurred on occasion since the BEACH study began in April 1998:

- More detailed coding systems for pharmaceuticals, pathology and imaging test orders were developed, and these were applied from year 3 (2000-01) onwards. In these cases, change is measured from 2000-01 because earlier years are not comparable.
- Two changes were made to the BEACH form from 2005-06 onwards to capture practice nurse activity associated with the GP-patient consultations. From 2005-06 onwards:
 - GPs could record multiple (up to three) Medicare item numbers
 - in the 'other treatments' section, for each problem managed, the GP was asked to tick the practice nurse box if the treatment recorded was provided by the practice nurse rather than by the GP. If the box was not ticked, the research team assumed that the GP gave the treatment.

These two changes have implications for the reporting of Medicare/DVA-claimable encounters (Chapter 5), practice nurse activity (Chapter 13) and other treatments (Chapter 10).

Medicare/DVA-claimable encounters

For the first 7 years of the BEACH program (1998-99 to 2004-05), where a Medicare item number was claimable for the encounter, the GP was instructed to record only one item number. Where multiple item numbers (for example, an A1 item such as 'standard surgery consultation' and a procedural item number) were claimable for an encounter, the GP was instructed to record the lower of these (usually an A1 item number). For reporting purposes Medicare-claimable encounters were broken down according to the item number recorded by the GP as claimable (either through Medicare or through DVA) for the encounter.

In this report the Medicare/DVA claimable encounters count only one item number per Medicare/DVA-claimable encounter for comparability with previous years (see Chapter 5). Practice nurse Medicare-claimable encounters are not reported in Chapter 5.

The selection of one item number was undertaken on a priority basis: consultation item numbers override incentive item numbers, which override procedural item numbers, which override other Medicare item numbers.

Practice nurse activity

The research team began to capture practice nurse activity (in 2005–06) due to the introduction of four new MBS item numbers in November 2004 which covered some selected activities conducted by a practice nurse on behalf of a medical practitioner.²³

The primary aim of BEACH is to describe general practice activity. Before 2005–06, ‘general practice activity’ has been described in terms of GP–patient encounters and this was considered close to equivalent to ‘general practitioner activity’. However, the introduction of the practice nurse item numbers meant that, if practice nurse activity associated with the GP–patient encounter was not included, the content of the consultation was not fully described.

Chapter 13 provides a breakdown of the practice nurse Medicare items claimed, the morbidity managed with the assistance of the practice nurse, and the other treatments given by the practice nurse as recorded by the GP participants from 2005–06 to 2008–09.

When viewing these results, it must be remembered that these practice nurse data do not include activities undertaken by the practice nurse during the GP’s BEACH recording period that were performed outside the recorded encounter. These could include Medicare-claimable activities (for example immunisations/vaccinations) provided under instruction from the GP but not provided at the time of the encounter recorded in BEACH, or provision of other activities not currently claimable from Medicare (for example dietary advice on a one-to-one basis, or in a group situation).

Other treatments

In the chapter on other treatments (Chapter 10), all recorded clinical and procedural treatments are included, irrespective of whether they were provided by the GP or by the practice nurse.

2.10 Classification of data

The following data elements are classified according to the International Classification of Primary Care – Version 2 (ICPC-2), a product of the World Organization of Family Doctors (Wonca)²⁴:

- patient reasons for encounter (RFEs)
- problems managed
- clinical treatments (for example, counselling, advice)
- procedural treatments
- referrals
- investigations ordered (including pathology, imaging and other investigations).

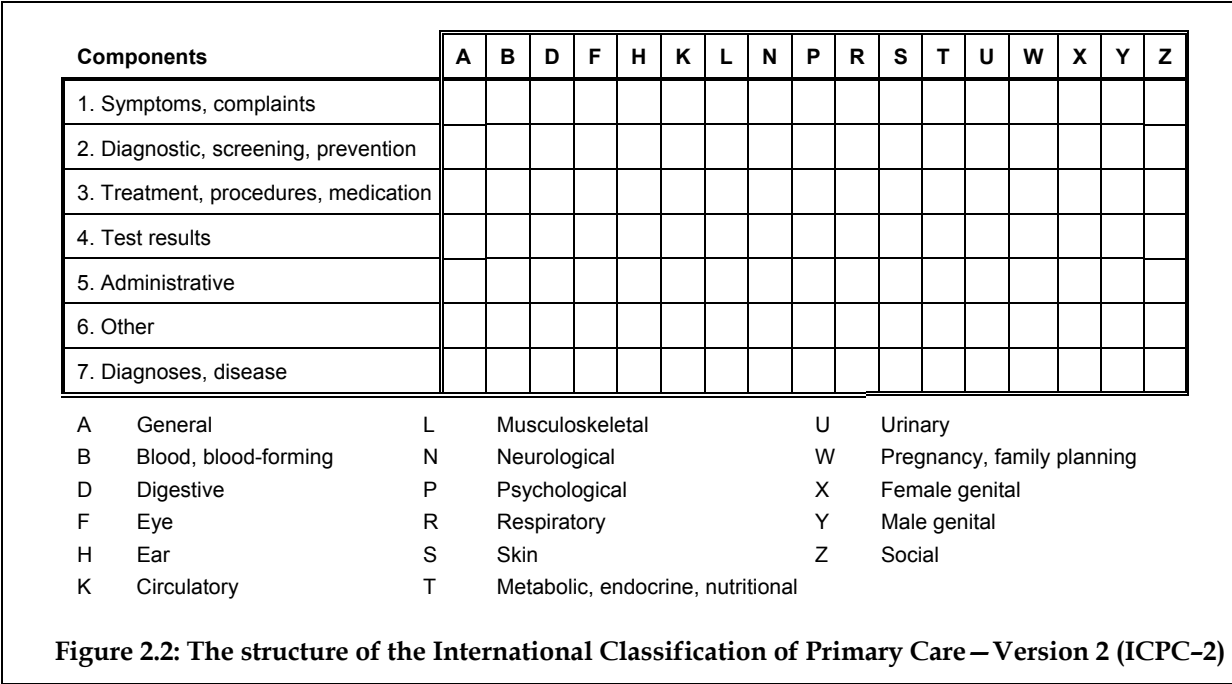
The ICPC-2 is used in more than 45 countries as the standard for data classification in primary care. It is accepted by the World Health Organization (WHO) in the WHO Family of International Classifications²⁵, and is the declared national standard in Australia for reporting of health data from general practice and patient self-reported health information.²⁶

The ICPC-2 has a biaxial structure, with 17 chapters on one axis (each with an alphabetic code) and seven components on the other (numeric codes) (Figure 2.2). Chapters are based on body systems, with additional chapters for psychological and social problems.

Component 1 includes symptoms and complaints. Component 7 covers diagnoses. These are independent in each chapter and both can be used for patient RFEs or problems managed.

Components 2 to 6 cover the process of care, and are common throughout all chapters. The processes of care, including referrals, other (non-pharmacological) treatments and orders for pathology and imaging, are classified in these process components of ICPC-2. Component 2 (diagnostic, screening and prevention) is also often applied in describing the problem managed (for example, check-up, immunisation).

The ICPC-2 is an excellent epidemiological tool. The diagnostic and symptomatic rubrics have been selected for inclusion on the basis of their relative frequency in primary care settings, or because of their relative importance in describing the health of the community. It has approximately 1,370 rubrics and these are sufficient for meaningful analyses. However, reliability of data entry, using ICPC-2 alone, requires a thorough knowledge of the classification for correct classification of a concept to be ensured.



In 1995, recognising a need for a coding and classification system for general practice electronic health records, the FMRC (then the Family Medicine Research Unit) developed an extended vocabulary of terms classified according to the ICPC, now called ICPC-2 PLUS.²⁷ This is an interface terminology, developed by the FMRC from all the terms used by GPs in studies such as the Australian Morbidity and Treatment Survey 1990–91²⁸, the Morbidity and Therapeutic Index 1992–1998 (a clinical audit tool that was available to GPs), and BEACH 1998–2009, that together have included more than 1.5 million encounter records. These terms are classified according to ICPC-2 to ensure international standards for reporting. Readers interested in seeing how coding works can download the ICPC-2 PLUS Demonstrator at <www.fmrc.org.au/icpc2plus/demonstrator.htm>.

When the free-text data are received from the GPs, trained secondary coders (who are undergraduate students studying health information management or medical science) code

the data in more specific terms using ICPC-2 PLUS. This ensures high coder reliability and automatic classification of the concept, and provides the ability to ‘ungroup’ such ICPC-2 rubrics as ‘other diseases of the circulatory system’ and select a specific disease from the terms within it.

Presentation of data classified in ICPC-2

Statistical reporting is almost always at the level of the ICPC-2 classification (for example, acute otitis media/myringitis – ICPC-2 code H71). However, there are some exceptions where data are grouped either above the ICPC-2 level or across the ICPC-2 level. These grouped morbidity, pathology and imaging codes are defined in Appendix 4, and chronic morbidity groups are provided in Appendix 5.

Reporting morbidity with groups of ICPC-2 codes

When recording problems managed, the GP may not always be very specific. For example, in recording the management of hypertension, they may simply record the problem as ‘hypertension’. In ICPC-2, ‘hypertension, unspecified’ is classified as ‘uncomplicated hypertension’ (code K86). There is another code for ‘complicated hypertension’ (K87). In some cases the GP may simply have failed to specify that the patient had hypertension with complications. The research team therefore feels that for national data reporting, it is more reliable to group the codes K86 and K87 and label this ‘Hypertension*’ – the asterisk indicating that multiple ICPC-2 codes (as in this example) or ICPC-2 PLUS codes (see below) are included. Appendix 4 lists codes included in these groups.

Reporting morbidity with groups of ICPC-2 PLUS codes

In other cases a concept can be classified within (but be only part of) multiple ICPC-2 codes. For example, osteoarthritis is classified in ICPC-2 in multiple broader codes according to site, for example, L92 – shoulder syndrome (includes bursitis, frozen shoulder, osteoarthritis of shoulder, rotator cuff syndrome). When reporting osteoarthritis in this publication, all the more specific osteoarthritis ICPC-2 PLUS terms are grouped within all the appropriate ICPC-2 codes. This group is labelled ‘Osteoarthritis*’ – the asterisk again indicating multiple codes, but in this case they are PLUS codes rather than ICPC-2 codes. Appendix 4 lists codes included in these groups.

Reporting chronic morbidity

Chronic conditions are medical conditions characterised by a combination of the following characteristics: duration that has lasted or is expected to last 6 months or more, a pattern of recurrence or deterioration, a poor prognosis, and consequences or sequelae that affect an individual’s quality of life.

To identify chronic conditions, a chronic condition list²⁹ classified according to ICPC-2 was applied to the BEACH data set. In general reporting, both chronic and non-chronic conditions (for example, diabetes and gestational diabetes) may have been grouped together when reporting (for example, diabetes – all*). When reporting chronic morbidity, only problems regarded as chronic have been included in the analysis. Where the group used for the chronic analysis differs from that used in other analyses in this report, they are marked with a double asterisk. Codes included in the chronic groups are provided in Appendix 5.

Reporting pathology and imaging test orders

All the pathology and imaging tests are coded very specifically in ICPC-2 PLUS, but ICPC-2 classifies pathology and imaging tests very broadly (for example, a test of cardiac enzymes is classified in K34 – Blood test associated with the cardiovascular system; a CT scan of the lumbar spine is classified as L41 – Diagnostic radiology/imaging of the musculoskeletal system). In Australia, the MBS classifies pathology and imaging tests in groups that are relatively well recognised. The team therefore regrouped all pathology and imaging ICPC-2 PLUS codes into MBS standard groups. This allows comparison of data between data sources. These groups are marked with an asterisk, and inclusions are provided in Appendix 4.

Classification of pharmaceuticals

Pharmaceuticals that are prescribed, provided by the GP or advised for over-the-counter purchase are coded and classified according to an in-house classification, the Coding Atlas for Pharmaceutical Substances (CAPS).

This is a hierarchical structure that facilitates analysis of data at a variety of levels, such as medication class, medication group, generic composition and brand name.

Strength and regimen are independent fields that, when combined with the CAPS code, give an opportunity to derive the prescribed daily dose for any prescribed medication or group of medications.

CAPS is mapped to the Anatomical Therapeutic Chemical (ATC)³⁰ classification, which is the Australian standard for classifying medications at the generic level.

The ATC has a hierarchical structure with five levels. For example:

- Level 1: C – Cardiovascular system
- Level 2: C10 – Serum lipid reducing agents
- Level 3: C10A – Cholesterol and triglyceride reducers
- Level 4: C10AA – HMG CoA reductase inhibitors
- Level 5: C10AA01 – Simvastatin (the generic drug).

Reporting pharmaceutical data

For pharmaceutical data, there is the choice of reporting in terms of the CAPS coding scheme or the ATC. They each have advantages in different circumstances.

In the CAPS system, a new drug enters at the product and generic level, and is immediately allocated a generic code. Therefore, the CAPS classification uses a bottom-up approach.

In the ATC, a new generic drug type may initially enter the classification at any level (1 to 5), not necessarily always at the generic level. Reclassification to lower ATC levels may occur later. Therefore, the ATC uses a top-down approach.

When analysing medications across time, a generic medication that is initially classified to a higher ATC level will not be identifiable in that data period and may result in under-enumeration of that drug during earlier data collection periods.

In measuring changes in medications over time, the team chose to report at Level 2 of the ATC (which is more stable over time than Level 3), and in CAPS for the generic-level drugs.

2.11 Quality assurance

All morbidity and therapeutic data elements were secondarily coded by staff entering key words or word fragments, and selecting the required term or label from a pick list. This was then automatically coded and classified by the computer. A quality assurance program to ensure reliability of data entry includes ongoing development of computer-aided error checks ('locks') at the data entry stage, and a physical check of samples of data entered versus those on the original recording form. Further logical data checks are conducted through SAS on a regular basis.

2.12 Validity and reliability

A discussion of the reliability and validity of the BEACH program has been published elsewhere.³¹ In this section we touch on some aspects of reliability and validity of active data collection from general practice that should be considered by the reader.

In the development of a database such as BEACH, data gathering moves through specific stages: GP sample selection, cluster sampling around each GP, GP data recording, secondary coding and data entry. At each stage the data can be invalidated by the application of inappropriate methods. The methods adopted to ensure maximum reliability of coding and data entry have been described above. The statistical techniques adopted to ensure valid analysis and reporting of recorded data are described in Section 2.6. Previous work has demonstrated the extent to which a random sample of GPs recording information about a cluster of patients represents all GPs and all patients attending GPs.³² Other studies have reported the degree to which GP-reported patient RFEs and problems managed accurately reflect those recalled by the patient³³ and the reliability of secondary coding of RFEs³⁴ and problems managed.²⁸ The validity of ICPC as a tool with which to classify the data has also been investigated in earlier work.³⁵

However, the question of the extent to which the GP-recorded data are a reliable and valid reflection of the content of the encounter must also be considered. In many primary care consultations, a clear pathophysiological diagnosis is not reached. Bentsen³⁶ and Barsky³⁷ suggest that a firm and clear diagnosis is not apparent in about half of GPs' consultations, and others suggest the proportion may be even greater.³⁸ Further, studies of general ambulatory medical practice have shown that a large number of patients presenting to a primary care practitioner are without a serious physical disorder.^{39,40} As a result, it is often necessary for a practitioner to record a problem in terms of symptoms, signs, patient concerns, or the service that is requested, such as immunisation. For this reason, this report refers to patient 'problems' rather than 'diagnoses'.

A number of studies have demonstrated wide variance in the way a GP perceives the patient's RFE and the manner in which the GP describes the problem under management. In a direct observational study of consultations via a one-way mirror, Bentsen demonstrated differences in the way practitioners labelled problems, and suggested that clinical experience may be an important influence on the identification of problems within the consultation.³⁶ Two other factors that might affect GPs' descriptions of patient RFEs have been identified: even when individuals select the same stimuli, some label each stimulus separately whereas others cluster them under one label and individuals differ in the number of stimuli they select (selective perception).⁴¹

The extent to which therapeutic decisions may influence the diagnostic label selected has also been discussed. Howie⁴² and Anderson³⁹ argue that, while it is assumed that the diagnostic process used in general practice is one of symptom → diagnosis → management, the therapeutic method may well be selected on the basis of the symptom, and the diagnostic label chosen last. They suggest that the selection of the diagnostic label is therefore influenced by the management decision already made.

Anderson has also pointed out that the therapeutic decision may be influenced by fashion, and, in turn, this affects the selection of the problem label. He gives the example of a rise in the occurrence of neurotic depression in parallel with a decrease in the use of menopause as a diagnosis in the United Kingdom, and suggests this may be the result of a change in the preferred treatment from oestrogen therapy to antidepressants.³⁹ This should be remembered when considering the changes in general practice described in this report.

Alderson contends that to many practitioners 'diagnostic accuracy is only important to the extent that it will assist them in helping the patient'. He further suggests that if major symptoms are readily treatable, some practitioners may feel no need to define the problem in diagnostic terms.⁴³ Crombie stated that in the second and third national morbidity surveys in the United Kingdom there was 'enormous variability in the rates at which doctors perceive and record illnesses'. He concluded that the probable cause arose from the different ways in which GPs gave priority in their perceptions and recording of certain morbidities while discounting or ignoring others. He was unable to account statistically for this variation by the effect of geography, age, sex or class differences in the practice populations.⁴⁴ Differences in the way male and female GPs label problems also appear to be independent of such influences.⁴⁵

These problems are inherent in the nature of general practice. Knottnerus argues that the GP is confronted with a fundamentally different pattern of problems from the specialist, the GP often having to draw up general diagnostic hypotheses related to probability, severity and consequences.⁴⁶ Anderson suggests that morbidity statistics from family practice should therefore be seen as 'a reflection of the physician's diagnostic opinions about the problems that patients bring to them rather than an unarguable statement of the problems managed'.³⁹ In any case, doctors base their actions on problems as they perceive them.

While these findings regarding limitations in the reliability and validity of practitioner-recorded morbidity should be kept in mind, they apply equally to data drawn from medical records, whether paper or electronic, as they do to active data collection methods.^{47,48} There is as yet no more reliable method of gaining detailed data about morbidity and its management in general practice. Further, irrespective of the differences between individual GPs in their labelling of the problems, morbidity data collected by GPs in active data collection methods have been shown to provide a reliable overview of the morbidity managed in general practice.⁴⁹