Prescribing Information Resources: Use and preference by general practitioners

An exploratory survey of general practitioners

Report to the Ministry of Health

by

The Centre for Health Services Research and Policy

and

Department of General Practice and Primary Health Care

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Executive Summary

Introduction

The Ministry of Health (the Ministry) through the New Zealand Medicines and Medical Devices Safety Authority (Medsafe), along with other agencies and bodies such as medical schools, the Pharmaceutical Management Agency of New Zealand (PHARMAC) and the Best Practice Advocacy Centre (bpac^{nz} – providers of 'best practice' information), provides resources that aim to assist general practitioners (GPs) in being informed about the most appropriate medicines to prescribe for patients. The nature of information resources used and those that would be preferred has not been established to date.

The Ministry commissioned this study. The study phases included survey design, questionnaire development, participant recruitment and data collection, and dissemination.

The survey addressed the following research questions regarding GPs' prescribing.

1. What types of information sources do GPs use at present?
2. What factors impact on the GP's decision to use a particular source?
3. What sources do GPs use to keep up-to-date with changes?
4. What importance do GPs attribute to each source?
5. What further information might GPs like to help them make decisions about what and when to prescribe medicines to their patients?
6. What sources do GPs value the most?

Methods

The survey comprised two sampling frames.

1. Main survey – A random sample of 199 GPs throughout New Zealand was drawn from a national database supplied by MediMedia (NZ) Ltd (now CMPMedica (NZ) Ltd). Initial contact was made with the GPs by fax, and follow-up phone calls were made to confirm interview times. The final sample size for the main survey was 99 GPs.
2. Trainee survey – A separate sub-survey of recent trainees was conducted, where recent trainees were defined as those who had graduated with their medical degrees within the last eight years. This sub-survey's sampling process used the regionally based lists for The Royal New Zealand College of General Practitioners (RNZCGP) training programme to identify and contact new graduates. The total number of recent GP trainees participating was 17.

Data collection was carried out using Computer Assisted Telephone Interviewing (CATI) for both sampling frames, providing an interviewer with questions electronically on screen with responses entered directly into a database during the interview. The questionnaire averaged 28 minutes in length and covered topics specific to the use of prescribing information sources, factors influencing prescribing, demographics and selected clinical cases.

Results

Data were collected from two separate samples of GPs throughout New Zealand. The main random sample of participating GPs (main survey, N = 99) was similar in characteristics (e.g. gender, proportion rural, and Primary Health Organisation (PHO) and/or Independent Practitioners' Association (IPA) status to other national samples of GPs surveyed. The second, non-random sample of GPs (trainee survey, N = 17) was of 'recent trainees', defined as those who had graduated with their medical degrees within the last eight years. The findings from the main survey group are summarised below.

Information resources

Text

- *MIMS New Ethicals*[1] drug information book was, not surprisingly, the most commonly used source of prescribing information for drug dosage, drug interaction and adverse reactions (87% of GP respondents). Most GPs felt it was useful or very useful (83% of users). Other sources were accessed more often for information about complex prescribing situations such as hepatic impairment and use of medications in pregnancy.
- The *British National Formulary*[2] (*BNF*) was used as an infrequent source of drug prescribing information, but it was also felt to be of some use.
- GPs received daily mailed information from the pharmaceutical industry but felt the information was of limited use or no use at all.
- Two-thirds of GPs indicated they used medical journals to inform their prescribing. All those GPs who used the *New Ethicals Journal* found it to be of some use, with 90% rating it useful or very useful.

Organisational

- PHARMAC prescribing information was used mainly for funding-related information and was felt to be mainly of limited use or difficult to use.
- bpac^{nz}, a national educational service for GPs, was used by approximately two-thirds of GPs surveyed. Those who used it felt it was of intermediate usefulness.
- Medsafe information (particularly web-based data sheets) was used by just over half of the GPs, and 70% of users reported finding it useful or very useful.
- Information from Independent Practitioners' Associations (IPAs) and Primary Health Organisations (PHOs) was used mainly on a weekly/monthly basis and was felt to be useful or very useful by 75% of users.

Internet

- Internet-based sources of prescribing information were used by nearly half of the GPs asked (43%). Websites were infrequently used but were considered to be very useful. The Medsafe website was the one most commonly used.

[1] A publication including most available primary medical care prescription drugs and treatments (published as *MIMS New Ethicals*). Published by CMPMedica (NZ) Ltd, 3 Shea Terrace, Takapuna, Auckland (PO Box 31 348, Milford, Auckland). Previously known as *New Ethicals*.

[2] Produced by the British Medical Association and the Royal Pharmaceutical Society of Great Britain.

People

- Pharmacists were used by most of the GPs on a weekly or monthly basis for advice, and they were felt to be very useful.
- Pharmaceutical representatives were seen by over 70% of all GPs, who all used pharmaceutical representative information (particularly written material) about new and existing drugs.
- GP colleagues were also, in the main, accessed on a weekly basis and felt to be very useful.
- Hospital-based colleagues were accessed less frequently, monthly/yearly, but when accessed were generally felt to be very useful. Private specialists were accessed less often but were also regarded as very useful for prescribing advice.

Influences on prescribing

- Influences on GP prescribing were largely judged to be a combination of patient factors and the cost to patients.
- Direct-to-consumer advertising (DTCA) was not often deemed by the GPs to have a significant impact on prescribing. However, it was reported by participating GPs as a factor that influenced patients' expectations of prescribing.
- Perceived patient expectations were in themselves often considered influential on prescribing. Specifically, the cost of drugs to patients was frequently reported to have some or a strong influence on prescribing.
- GPs who followed recommended practice in their prescribing were slightly more likely to have broadband (fast) internet access in their clinic (80.6% versus 75% for 'other practice' prescribers) and to a lesser extent in their consulting room than 'other practice' GPs.

Conclusions and implications

1. There is no single source of prescribing information available to New Zealand GPs that provides all the information GPs require or want to have available. A suggestion is made in point 2 below as to how a joint integrated source could be achieved without the expense and effort of creating a new prescribing resource.
2. *MIMS New Ethicals* appeared to be the most commonly used source of prescribing data for GPs. One option would be to work with the publishers to make it an even more useful source of information. It currently does not provide sufficient detail on pregnancy, lactation and renal and liver dysfunction. Alternatively developing a companion resource to cover those areas not well documented by *MIMS* could be an option. If such a resource contained information on the above-mentioned deficient areas along with malaria, travel health and medication pricing information (PHARMAC issues), GPs would have two sources for most of their prescribing needs. This could also be a location for the New Zealand Guidelines Group (NZGG) information.
3. Recommended practice GP prescribers were slightly more likely to have broadband internet access available in the general practice setting, suggesting that such a facility assists recommended practice. There may be some merit in making broadband internet access mandatory in general practice and providing some resources to ensure that this happens.

4. Malaria and travel health information: The forerunner to *MIMS New Ethicals* was the *New Ethicals* booklet. This contained information on malaria prophylaxis and the geographical areas that were chloroquine-resistant. This information is no longer available in *MIMS New Ethicals*. The GP respondents reported a wide and unsatisfactory range of sources for malaria prophylaxis information, many involving contacting other health professionals, with the conclusion being that finding this information is potentially a time-consuming activity. There would be some advantage in recommending usage of websites such as the World Health Organization (WHO) or Centers for Disease Control and Prevention (CDC). This would solve the problem of not having an up-to-date source in New Zealand. Having rapid broadband internet access may facilitate this.
5. A number of GPs were not aware that the *BNF* was available online (at www.bnf.org). Making this and similar useful websites known and available to GPs would be helpful.
6. Further research, investigating the impact of patients' expectations, where they are influenced by DTCA, on GPs' prescribing, is warranted.
7. The impact that the cost of drugs to patients has on GPs' prescribing needs to be further investigated as GPs in this study reported this as a significant influence.
8. Development of strategies to improve prescribing would be best targeted at not only GPs but also pharmacists, other health care professionals and patients. This would require evaluation and further research.

1 Introduction

1.1 Background to the project

The Department of General Practice and Primary Health Care and the Centre for Health Services Research and Policy (CHSRP), School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland, undertook a project tendered by the Ministry of Health (the Ministry) entitled 'Research on the Information Resources General Practitioners Use and Would Prefer to Use to Inform Their Prescribing Decisions'. The project was contracted to Auckland UniServices Limited, led by Associate Professor Bruce Arroll and managed by Daniel Patrick. The survey was conducted from June to August 2004.

The Ministry through the New Zealand Medicines and Medical Devices Safety Authority (Medsafe), along with other agencies and bodies such as medical schools, the Pharmaceutical Management Agency of New Zealand (PHARMAC) and the Best Practice Advocacy Centre (bpac^{nz} – providers of 'best practice' information) provides resources that aim to assist general practitioners (GPs) to be informed about the most appropriate medicines to prescribe for patients. For example, Medsafe is responsible for regulating medicines, medical schools inform trainee doctors about the practice of medicine and PHARMAC makes decisions on which medicines will be subsidised and provides information that promotes the responsible use of pharmaceuticals.

A prescribing decision may have several dimensions. At a basic level, such a decision may be determined by choosing from amongst the different types of medicines funded by PHARMAC, or choosing those that attract the highest subsidies. In a wider sense, a prescribing decision is one that a GP makes based on his or her assessment of what is therapeutically most appropriate for the patient and may include a wide range of inputs. The Ministry sought knowledge about prescribing decisions as understood in these and other senses. It commissioned a study to explore the sources that GPs use to inform themselves on prescribing decisions once they have left medical school and the related but separate issue of how GPs keep their information up to date.

The fact that information is available does not necessarily mean that it is used, or that it is available in a format that GPs wish to use. The Ministry sought the types of information to inform prescribing decisions that GPs would like to see available, as well as those that were currently available. For example, GPs may prefer to see changes to the information currently provided by the Ministry, or other sources, in the areas of delivery, content, format or range. Preferences between present information sources and any preferred sources not currently available are important.

Sources of medicinal information currently available to GPs include:

- Medsafe-approved medicine data sheets (published on the Medsafe website and in the *New Ethicals Compendium*)
- best practice publications
- treatment guidelines
- information provided by Primary Health Organisations (PHOs)
- continuing medical education (CME) programmes
- medical journals, or bulletins such as *Prescriber Update*
- information provided by pharmaceutical companies
- personal experience and the advice of peers
- information supplied by patients (whose preferences may also have an impact on prescribing decisions).

The Ministry recognised that pharmaceutical companies play a significant role in the development of new pharmaceuticals. Recently, however, there has been considerable debate in medical journals over the appropriateness of some types of information that the pharmaceutical industry is supplying to GPs. The Ministry wished to know if the concerns being raised overseas were also prevalent in New Zealand.

Issues of interest to the Ministry were: the frequency with which different sources of information were used; the relative impact of each of these sources on the decisions made by GPs; and whether the relative use of these sources of information differed among GPs in discernable patterns (for example, were there differences between GPs related to the types of organisations they were affiliated with, such as different PHOs/IPAs, or did they differ by age or the size of their practices?).

The Ministry sought this information to help in shaping the development of policy, the provision of information that GPs seek and, in a wider sense, the implementation of the Primary Health Care Strategy. With the establishment of PHOs, and the Performance Framework to be implemented in 2005/06,[3] there will be the possibility for further development of clinical governance capability.

1.2 Aims and research questions

The survey had three key aims, which were:

1. to establish sources GPs use to inform themselves on prescribing decisions
2. to describe how GPs keep their information up to date
3. to establish what other factors influence GPs' prescribing decisions.

The survey addressed the following six research questions.

1. What types of information sources do GPs use at present?
2. What factors impact on a GP's decision to use a particular source?
3. What sources do GPs use to keep up to date on changes?
4. What importance do GPs attribute to each source of information?
5. What further information might GPs like to help them make decisions about what and when to prescribe medicines to their patients?
6. What sources do GPs value the most?

1.3 Literature review

A comprehensive review of the literature was undertaken, examining the sources of information GPs use to update their knowledge, their adoption of a new drug for a specific treatment and factors that influence their prescribing patterns. Most of the accessed research is international, but New Zealand studies are referred to where available. The full literature review is contained in Appendix 1. The accumulated evidence indicates that GPs face a considerable challenge in keeping up to date with the rapidly increasing knowledge base of medicine.

[3] Draft operational framework for PHO performance management, Ministry of Health, April 2004.

1.3.1 *Information sources for GPs*

Sources used by doctors to find medical knowledge include textbooks, journals and electronic databases, but it is difficult for them to find up-to-date information to match the requirements of their individual patients, and the volume of information provided may overwhelm them (Smith 1996). Clinical questions that need information regularly arise when doctors see patients. Many of these questions are about drugs and are complex and multidimensional, questioning more than medical knowledge – doctors are looking for guidance, support, affirmation and feedback. Most questions arising during a consultation are answered, although mostly not using electronic sources. Arroll et al, in a survey of New Zealand family physicians conducted during the years 1999–2000, found that only 6 of 113 answered questions (out of a total 122 questions) asked by patients were answered using a computerised source (Arroll et al 2002).

A literature review concluded that GPs used information sources in the following order of frequency: colleagues, books and journals, libraries and printed or online bibliographies (Verhoeven et al 1995). Cost factors such as time and energy needed to search for information were viewed as being more important than the quality of the information, and the most frequently used sources were those that were readily available, easy to search through and understandable. Because of the information explosion, the difficulty for GPs lies in selecting relevant information rather than accessing information (Gerrett and Clark 1997). Most use a small range of information sources that are summaries in the form of desktop sources.

Connelly et al identified five criteria GPs use to assess information sources: credibility, availability, searchability, understandability and applicability (Connelly et al 1990). On the basis of these criteria, an ideal information source is directly relevant, has valid information and can be accessed quickly with a minimum amount of work (Smith 1996). Availability and applicability both predict increased use of a knowledge resource (Smith 1996).

GPs are most likely to use drug reference books such as the *Merck Manual* and Harrison's *Principles of Internal Medicine* for prescribing information (Smith 1996). New Zealand GPs frequently use the *British National Formulary* (*BNF*) or the *Monthly Index of Medical Specialties* (MIMS (MIMS New Ethicals)) to check doses and interactions, but while textbooks are consulted most frequently, they are rated as less valuable than colleagues and specialists as information sources (Cullen 1997). Non-peer-reviewed publications are more likely to influence GP prescribing than scientific peer-reviewed journals (Prosser et al 2003).

The internet offers huge potential for doctors to access information, but it can be time consuming, and the amount of information available can be confusing. Easy access to evidence-based information is needed (Jadad et al 2000). In 2001, 37% of New Zealand GPs were found to have searched the internet on occasion for drug information (Cullen 2002). GPs were most likely to use Medline or search engines. Studies indicate that GPs require training in basic information literacy, identifying evidence-based sources and critical appraisal skills. Portals to guide GPs to selected resources and a document delivery service would help GPs get useful citations from Medline without delay or cost. By 1999, most New Zealand rural GPs had internet access either at home or at work (Kerse et al 2001). However, a 2003 survey of rural GPs found that only one-third were using the internet for help with patient care at least once weekly (Janes et al 2004). A United States study found that computer applications such as CD-ROMs or the internet made up only 2% of the information sources family physicians used to answer clinical questions (Ely et al 2000).

Computer-based clinical decision support systems may improve clinician performance, although outcomes such as drug dose determination have not shown consistent improvement (Hunt et al 1998). Speed of access is a more important factor for effective clinical decision support than the quality of the information source (Bates et al 2003). While electronic prompts and alerts may assist prescribing, GPs may experience 'flag fatigue' if these are too frequent, of little clinical significance or inappropriate for particular patients (Ahearn and Kerr 2003). GPs need to be trained in the use of these decision-making tools to be able to use them to their full extent.

1.3.2 *New drug adoption by GPs*

Introduction of a new drug usually occurs proactively by means of extensive advertising and academic detailing provided by the pharmaceutical industry. Dissemination of independent scientific data about a new drug or guidelines relating to drug use seldom enjoys an equivalent degree of financial backing. When evaluating new drugs, GPs use the information itself, the credibility of the communicator and their own clinical experience. Initial use of the drug is on a personal 'trial' basis, and future use of a drug is strongly influenced by the initial experience of prescribing the drug to a particular patient as well as obtaining information from credible sources (Prosser et al 2003, Jones et al 2001). GPs' own assessments of what forces influence their prescribing behaviour are not a reliable measure of actual influencing forces (Avorn et al 1982).

1.3.3 *Factors beyond clinical presentation that influence prescribing decisions by GPs*

There is a tendency for GPs to be reactive recipients of rather than active searchers for drug information. Available time and resources are critical factors in prescribing decision-making. New Zealand GPs have been found mainly to use resources that they have available to them at the office – textbooks were most preferred, then colleagues (in their own practice and specialists or consultants) and journal articles that they have filed in the office (Cullen 1997). They tend not to use medical libraries because of access problems, a lack of skill in using catalogues and databases and difficulty in applying research literature to clinical situations. They ranked the internet higher than medical libraries as a source of information (Cullen 2002).

Pharmaceutical company information, especially that provided by visiting representatives, may be a very important prescribing influence (Prosser and Walley 2003). GPs may not self-report accurately, and drug company information may influence them more than they realise (McGettigan et al 2001, Avorn et al 1982). Of concern is the fact that most drug advertising material and marketing brochures contain information with no basis in scientific evidence (Tuffs 2004).

Community pharmacists can influence prescribing by regularly although infrequently recommending to prescribers that they initiate, discontinue or change drug therapy – GPs usually accept and implement their suggestions (Carroll 2003).

GPs both in New Zealand and overseas have been shown to be influenced by hospital prescribing, with respected colleagues being influential as prescribing leaders (Jones et al 2001, Prosser et al 2003, Cullen 1997). Advice from colleagues has been rated as more important than that from written pharmaceutical references (Avorn et al 1982), and the medium (that is, via people) may be more important than the message (McGettigan et al 2001).

Implementation of evidence-based medicine is influenced by the relationships that GPs have with individual patients, their reluctance to jeopardise these relationships and their perception of patient characteristics. Sometimes GPs' decisions were influenced by their knowledge of the patient's situation, and implementation may be limited because of logistics. Also, most physicians considered that patient preferences only had a small influence on their prescribing decisions, whereas one study found that patient preferences were a powerful driver (Avorn et al 1982). GPs' perception of patient pressure is strongly associated with prescribing (Little et al 2004). A New Zealand study found that 'low-cost' GP prescribers reported more general practice experience and appeared to have a more 'relaxed' attitude to medicine than 'high-cost' GP prescribers did (Jaye and Tilyard 2002).

New Zealand is one of only two industrialised countries that permit direct-to-consumer advertising (DTCA) for pharmaceuticals. A survey of New Zealand GPs found that 90% had had consultations specifically generated by DTCA. Only 10% believed that DTCA of prescription drugs was positive (Toop et al 2003). New Zealand GPs have petitioned the Minister of Health to ban DTCA (Kmietowicz 2003).

Early experience of using a drug influences future use, so feedback from the first few patients has an impact on whether or not a GP continues using a new drug (Jones et al 2001). Personal and professional experiences may have a strong impact on whether or not GPs implement evidence-based medicine – particularly the GPs' personal life experiences or experiences of hospital medicine as students or junior doctors. Accidents, mishaps and spectacular clinical successes have been shown to directly influence subsequent practice (Freeman and Sweeney 2001).

Changes in funding arrangements have been shown to influence GP prescribing. Prescribing in United Kingdom general practices before and after the GPs became fundholders showed fundholders had a lower rate of increase in prescribing costs (Wilson et al 1995). In New Zealand, PHARMAC uses reference pricing of pharmaceuticals to achieve a balance between access to pharmaceuticals and cost containment. PHARMAC does this by paying the same subsidy for all drugs that have the same or similar clinical therapeutic effect for treating the same or similar conditions, thus achieving cost containment by reimbursing drugs at the lowest price ruling for a therapeutic subgroup. PHARMAC's decision criteria include guidelines and evidence-based medicine, as well as cost containment goals (Metcalfe et al 2003). PHARMAC's aim is to provide the greatest good to the population as a whole within available financial resources, and its impact on GPs is to limit drug options in order to steer prescribing decisions towards those that benefit the population as a whole. This relieves GPs of the conflict between having to advocate solely for the patient in any one consultation and still consider best treatment for the population as a whole (Moodie et al 2003).

Academic detailing visits are effective in influencing prescribing behaviour, whether performed alone or in combination with other interventions (Thomson O'Brien et al 2002). Audits and feedback to health care professionals also have the potential to change prescribing behaviour (Jamtvedt et al 2003). However, merely posting out aggregated feedback data is unlikely to effect behaviour change (O'Connell et al 1999).

A single CME session is unlikely to change behaviour; rather change is evolutionary in response to acquiring new knowledge from a variety of different credible sources (Goodyear-Smith et al 2003). Effective strategies include reminders, patient-mediated interventions, outreach visits, opinion leaders and multifaceted activities (Davis et al 1995). CME meetings within the New Zealand setting may give GPs access to specialist knowledge that will significantly influence GPs' practice (Cullen 1997).

Critical incidents include events such as phone calls from pharmacists or long-term locums changing medications. A recommendation by a community pharmacist to initiate, discontinue

or change a drug therapy is usually accepted and implemented by a GP (Carroll 2003). Most suggestions relate to detecting and correcting clearly inappropriate drug therapy and are likely to also influence subsequent prescribing decisions.

1.4 Possible strategies suggested by the literature to encourage evidence-based prescribing

In summary, strategies that encourage GPs towards evidence-based prescribing need to address the five criteria of Connelly and colleagues to assess information sources: credibility, availability, searchability, understandability and applicability (Connelly et al 1990). Suggestions arising from the literature include:

- providing a number of interventions in combination with multifaceted interventions and reinforcement from different sources, which may combine to reach a 'critical mass', encouraging GPs to change prescribing behaviour (Goodyear-Smith et al 2003)
- encouraging GPs to formally identify their personal formularies and to review and rationalise these formularies, basing evaluation on the WHO principles of comparative efficacy, safety, suitability and the cost of the treatment alternatives. This may be best done within the context of managing particular clinical conditions, in conjunction with clinical guidelines (Robertson et al 2001)
- as new drug prescribing by GPs often follows that initiated by hospital colleagues, developing a joint approach to new drug introduction across primary and secondary care to be used by primary care bodies (Prosser et al 2003)
- ensuring that medical specialists have up-to-date and reliable knowledge and that they are aware of their influence and role in passing this knowledge on to GPs (Cullen 1997)
- providing evidence-based information in advertisement form (Avorn et al 1982)
- limiting the educational activities of the pharmaceutical industry (Figueiras et al 2000)
- distributing drug prescription information from independent agencies, using educational strategies that require personal contact and that generate positive attitudes among GPs towards these sources (Ibid.)
- training pharmacists to provide pharmaceutical care and encourage recommendations to GPs (Carroll 2003)
- encouraging GPs to directly ask patients about their expectations in order to avoid being pressured by incorrectly perceived patient preferences (Little et al 2004)
- repeating/reinforcing messages at 12- to 24-month intervals to help sustain changes in prescribing practice after an educational intervention, which tends to decay over time (Richards et al 2003)
- providing academic detailing to GPs (Habraken et al 2003)
- using a proactive approach to disseminate independent scientific data rather than relying on information spread by diffusion (Arroll et al 2003)
- training GPs in basic information literacy skills, identifying evidence-based sources and critical appraisal skills (Cullen 2002)
- providing internet portals to guide GPs to selected resources and a document delivery service that allows GPs to access useful citations from Medline without delay or cost (Cullen 2002)
- developing desirable features of an effective prescribing tool, including alphabetical and class-based organisation, search functions, point-of-care accessibility, regular updating, regular checks on interactions, specifying contraindications, identifying lactation and

obstetric hazards and providing adult and paediatric dosing, appropriate travel health information and advice on renal and liver problems.

1.5 This report

This report incorporates a review of published literature focused on the sources of information GPs use to update their knowledge, their adoption of a new drug for a specific treatment and factors that influence their prescribing patterns. Sub-group analyses have been undertaken; however, in the instance of the new trainees, no statistically reliable comparisons could be made due to the small and self-selected sample.

From here, this report is structured as presented below – including the following sections.

- The Methods section describes the methodology used to sample and recruit GPs, as well as the questionnaire development and data collection methods. Furthermore, the data management and analysis processes are described.
- The Results section includes descriptive tables of survey findings with details of the participant GPs' characteristics. Sub-groups analyses are included where comparisons of GPs were thought to be warranted. Results are categorised under 16 section headings as follows:
  - Participant characteristics
  - Primary prescribing resources
  - Frequency of use and value of standard prescribing resources
  - Frequency of use and value of medical journals for prescribing information
  - Use of internet resources
  - Medsafe
  - Practice management and internet facility
  - Use of colleagues and other health professionals
  - Information sources GPs identified a desire to have access to
  - Influences on prescribing
  - Response to clinical cases
  - Rural and urban practice setting
  - Age of GP participants
  - Workload: participant and practice characteristics
  - Gender of GP participants
  - New trainees.
- The Discussion section uses the main topics introduced in the literature review. Summary points from the literature and results are identified and discussed within each respective section. The sections are:
  - Prescribing sources used by GPs
  - How GPs keep up to date
  - Other factors influencing GP prescribing decisions
  - Factors influencing best prescribing practice
  - New trainee GPs
  - Strengths of this survey
  - Limitations of this survey.
- The Conclusions section provides details of the outcome of the survey as well as a sub-section of the authors' views and suggestions given their investigation of the topic and involvement in the survey. The sub-sections included are as follows:

  - Policy implications
  - Future prospects and speculations.

- The report also includes:
  - Appendices – containing a more substantial review of the literature, the participant information sheet and finally the data coding frames for further information and reference
  - A glossary and list of acronyms – this provides definitions of terms and abbreviations used within this report (e.g. PHO: Primary Health Organisation).

1.5.1 *Interpretation*

The tables presented in this report do not include missing values, and as such, sample numbers for different items within table rows or columns may differ. The sample numbers are presented where this is the case, in the row or column headers to indicate horizontal or vertical summing of figures (i.e. to 100%) respectively.

In some sections (e.g. in the use of medical journals), multiple responses to survey questions were possible; thus sample numbers may correspond between tables. Also, in general, table columns/rows may not sum to 100% due to rounding.

It must be noted that this survey was conducted during the implementation of the Primary Health Care Strategy (Minister of Health 2001). Therefore the establishment of Primary Health Organisations (PHOs) was in its early stages, with approximately 73 established at the time of this survey (July 2004).

1.5.2 *Definitions*

- 'Paperless practice' is defined as a practice where all record-keeping is computerised or electronic (e.g. computerised age/sex registers, patient records, lab reporting, prescribing and scanning letters from hospitals and specialists).
- 'Poor', in the context of a prescribing information source, refers to information that is not founded on evidence-based recommended practice.
- 'Prescribing resources' refers to the various sources of information that GPs use to inform their prescribing, for example, medical journals and websites that provide prescribing information.
- 'Recommended practice' was calculated by coding the participating GPs responses to the clinical scenarios included in the survey questionnaire. Those that were considered to be recommended practice met evidence-based recommended practice guidelines. The clinical scenarios are presented below.
  - A 75-year-old with new high blood pressure (hypertension) – what would be your first choice of drug and at what starting dose?
  - An eight-year-old with clinical and swab-proven *Streptococcal* tonsillitis (Strep. throat) – what antibiotic would you give and for what duration?
  - Where would you get information on malaria tablets for children and for pregnant women?
  - Where would you get information about which countries have chloroquine-resistant malaria?

2 Methodology

2.1 Organisation

The Department of General Practice and Primary Health Care and the Centre for Health Services Research and Policy (CHSRP), School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland, undertook this research project. In addition, the team involved the School of Pharmacy, The University of Auckland, for questionnaire design and analysis. The Ministry of Health funded this study.

2.2 Information collection – questionnaire design

A review of literature available both nationally and internationally was conducted to ascertain key indicators, measures and questions for the study. This ensured the data collection would answer relevant research questions and ensure comparability with similar international research. In addition to a literature review, consultation with key stakeholder representatives was undertaken, and the Ministry of Health reviewed and commented on the study questionnaire. Potential sources of information for prescribing and factors and sources of information that might influence prescribing behaviour were ascertained from previous international and New Zealand studies. Additionally, potential sources unique to New Zealand or under-researched in previous approaches were added.

During this stage, a pilot Computer Assisted Telephone Interviewing (CATI) survey was conducted on a 10% sub-sample of GPs (N = 11) with differing characteristics and backgrounds. This was to test for comprehension and questionnaire structure, and to allow for error-trapping within the CATI software.

As a result of the pilot interviews, the questionnaire was refined. Specific improvements included:

1. adding relevant values/categories to particular questions as required
2. streamlining the questionnaire structure to provide better flow
3. amending questions to improve clarity and remove ambiguity.

These pilot interviews were not included in the results presented within this report.

In addition, the pilot survey process guaranteed that the instrument was able to meet the aims set out for this project and ensured that the questionnaire was well structured, well understood and easily comprehended by the study participants.

The final questionnaire is available on request.[4]

2.2.1 *Computer based questionnaire*

CATI utilises software specifically designed for surveys and their management. The software used for this survey was Survey Systems version 8.1, produced by Creative Research Systems.

[4] Contact Daniel Patrick, email: d.patrick@auckland.ac.nz.

2.3 Sampling

2.3.1 *Main survey*

A random, nationally representative sample of 300 GP contacts, including telephone and fax numbers, was purchased from MediMedia (NZ) Ltd. (now CMPMedica (NZ) Ltd). Only 199 of the GPs in this sample were contacted in order to achieve the desired sample size (N = 100). This study ascertains various percentages of interest, and for a sample size of 100, the standard error of such percentages would be less than $\frac{1}{2\sqrt{100}} \times 100\% = 5\%$. The margin of error, approximately twice the standard error (95% confidence interval), would be less than 10%. The eventual sample size of the main survey was 99 GPs.

CMPMedica (NZ) Ltd. is the leading professional health care publisher in New Zealand with titles including *New Zealand Doctor*, *Pharmacy Today*, and *MIMS / New Ethicals Small Book*. CMPMedica has over 30 years experience providing health care database services to the professional health care market. The CMPMedica databank is a comprehensive New Zealand database of medical, pharmacy, dental and veterinary professionals. The database is updated daily as additions and amendments are received from a wide variety of sources including:

- field reports from industry representatives calling on health care professionals
- subscription and circulation updates to all mainstream professional publications, including *New Zealand Doctor*, *Pharmacy Today* and *New Ethicals Journal*
- CMPMedica's own mailing programme dedicated to soliciting data updates
- mail replies received by CMPMedica's contract mail business
- a range of other sources, including the Medical Council Register and IMS Brick Specifications.

2.3.2 *Trainee survey*

In addition to the random national sample (main survey), a separate subgroup survey of recent trainees was conducted, where recent trainees were defined as those who had graduated with their medical degree in the last eight years. The sampling process used for this subgroup survey relied on the regionally based lists for The Royal New Zealand College of General Practitioners (RNZCGP) training programme provided by programme coordinators, therefore enabling access to new graduates. Furthermore, to ensure a high response, an invitation to recent graduates to be involved in the study was advertised in *ePulse* (ePulse Vol. 6 No. 15, an RNZCGP electronic newsletter). The desired number of recent trainees was 10, and the advertisement increased responses. Thus the total number of recent GP trainees participating was 17.

2.4 Recruitment and data collection processes

Recruitment of randomly selected practitioners included the following steps.

1. Contact was made by fax, which included a cover letter, a Participant Information Sheet (PIS) and a return fax form. These documents advised the GP of all study details required to make a decision and requested the return fax form be sent back with a response. Tick box responses available were 'I am interested in the study, please call me to discuss it further'; 'Yes, I wish to be in the study, the following times are suitable'; 'Yes, I am interested in the study, please call my reception and arrange a time' and 'No, I do not wish to be involved in the study'.
2. The researcher making each initial telephone contact (fax follow-up) was either a practising GP, the project manager, or a pharmacist. If there was no response to the fax, the potential participant was followed up by a personal telephone call from one such researcher, who indicated the study objectives and the process by which information was to be gathered in order to seek the GP's consent to be involved.

3. After agreement from the GP participant, a suitable time and date (appointment) for a telephone interview was identified. Available times were 9 am to 8.30 pm, Monday to Friday and 10 am to 8 pm, Saturday and Sunday.

4. At the time of the agreed appointment, a research interviewer made phone contact with the GP and conducted a CATI, using the questionnaire developed for the study. At this stage if the respondent was busy or had an emergency to attend to, an alternative interview time was established via their receptionist, and the interviewer contacted the GP at the newly arranged interview time.

5. The participating GPs were paid for the appointment period taken – a fee of $40 exclusive of GST per participant was paid on receipt of a tax invoice – in recognition of the participant's contribution to research and the appointment time taken.

2.4.1 *Inclusion/exclusion criteria*

- Full-time and part-time GPs were included.
- Locum tenets were included.
- Doctors working exclusively at accident and medical clinics were excluded.
- Sub-specialty practitioners, for example sports medicine doctors, were excluded.

2.5 Computer assisted telephone interviewing (CATI)

The survey was administered by telephone using Computer Assisted Telephone Interviewing (CATI) techniques. CATI provides an electronic structured questionnaire that allows the interviewer to enter data directly into a data set, via a computer, thereby reducing data handling and entry time. Additionally, this is less likely to result in questionnaire misinterpretation and entry inconsistencies as the structured nature of the questionnaire results in pre-programmed logic being applied in real time. The CATI interviewers obtained verbal consent from the GP participants at the onset of each interview, though agreement had already been made at the time of recruitment. The interview averaged 28 minutes in length, including the interview preamble.

Real-time audio and visual monitoring of interviews (as data were input) was conducted, ensuring excellent accuracy and quality of interviews, and, in addition, ensuring that calls were made at appropriate times, in an effective manner and that automatic 'bring-ups' of call-back appointments were maintained. Because the responses were entered directly, there was no need for subsequent data entry. This real-time data set construction also enabled preliminary data to be analysed at an early stage and an analytical framework to be prepared.

2.6 Data

2.6.1 *Data set construction and management*

The data set was constructed in real time, enabling progress and sample analysis to occur during the course of the study very efficiently. The resulting data set underwent final validation and specific data logic checks to ensure data integrity.

2.6.2 *Data coding*

Data coding was automatically performed for a large number of questions as interviewers entered data into pre-coded fields, and collated data were readily transferred to statistical software (SAS). The free-text fields (questions) were coded retrospectively, using meaningful categories/coding frames for each question set.

The coding frames that were established utilised keywords and/or phrases within the text string. In the occurrence of two or more keywords or phrases (thus codes) in an individual's response to a single question, the first response was used for analysis. For example, an individual's

response of, 'call specialist and sometimes may refer to the *BNF*' would code to 'contact specialist' ('11.2'). The codes were all numeric, and additional variables were added to the final data set for their, and any further subgroup's, analysis. The coding frames for each of the free-form text fields are included as Appendix 3. Note that these frames do not indicate keywords or phrases for each of the coding categories.

2.6.3 *Statistical considerations*

Analysis was undertaken using the SAS software package. This included descriptive tabulations of all variables captured within the survey, cross-tabulations of related variables of interest and subgroup analysis where the numbers were sufficient. Percentage distributions of categorical variables and measures of central tendency or spread of continuous variables were examined for patterns that could then be interpreted.

2.6.4 *Data quality*

Free-text codes: A 50% random sample of observations was selected for quality control audits. Each question, and thus variable, that required retrospective data coding to be carried out using the coding frames developed for this study, was audited. Two auditors were chosen for this task, based on their expertise. They were either pharmacists or GPs. The auditors were instructed to report the level of agreement and also to correct the codes for the records that they did not agree with. Thus, the quality auditors were at the gold standard and ensured a high level of data quality and integrity.

Numeric or categorical variables: The use of CATI relies on specialised software, which handles questionnaire programming (skips, routing and entry restrictions), database construction and sample management. Thus all data had predetermined values/codes and had been tested prior to implementation for the live survey. However, to validate the entry and programmed questionnaire, some consistency checks were performed in SAS.

2.7 Ethical issues

Ethical approval was received from The University of Auckland Human Subjects Ethics Committee, reference 2004/167, for a period of three years.

All data collected were anonymised following the completion of interviews and then stored on a secure network drive.

3 Results

3.1 Participant characteristics

During this study, 199 GPs were approached to participate in the survey. Of those approached, 39 declined to participate and a further 60 were ineligible. Of those ineligible, 53 were unable to participate because they: were not contactable; were on leave; had left the practice or were not part of a true GP service. Four had left general practice, two were accident and medical practitioners (in accident and medical clinics) and one was deemed to be a specialist. There was also one GP who made it to the data collection phase but for whom only partial collection was obtained – this case was withdrawn. The eventual sample size of the main survey was thus 99 GPs. The response rate:

$$RR = \frac{P}{P + R + W}$$

where P = participants; R = refusals; and W = withdrawals, was therefore 71.7%.

The table below describes the characteristics of the participants in the main study (Table 3.1.1). The percentages of males (70.1%) and females (29.9%) were consistent with the proportions within the wider GP population. In comparison to the National Primary Medical Care Survey (NatMedCa) (Raymont et al 2004), the GPs' age, qualifications and practice characteristics (computerisation, size, etc.) were in similar proportions.

As would be expected, the majority of practitioners had completed a postgraduate training programme and most of these had been undertaken with The Royal New Zealand College of General Practitioners (RNZCGP). The median number of sessions worked was high at nine sessions per week (Table 3.1.1). This reflects the further observation that although nearly half the sample identified themselves as part-time workers, they still worked a median of seven sessions per week (Table 3.14.1).

A large proportion of participants worked in urban practices and, irrespective of practice setting, large proportions worked as part of Primary Health Organisations (PHOs) or Independent Practitioners' Associations (IPAs) (Table 3.1.2). Most of the participants had access to computerised prescribing systems (94.8%).

Table 3.1.1: Participant characteristics

Characteristic	GP participants (N = 97)
Gender (%)	
Male	70.1
Female	29.9
Age group (%)	
20–29	0
30–39	20.6
40–49	42.3
50–59	29.9
60–65	5.2
66 and over	2.1
Median time since graduation (years)	21.0
(Range)	(40.0)
Mean time in practice (years)	16.7
(Standard deviation)	(8.9)

Postgraduate training (%)	
RNZCGP / Fellow of the RNZCGP	59.8
Other	35.1
None	5.2
Median number sessions per week	9.0
(Range)	(13.0)
Fully computerised (%)	52.6
Computerised prescribing (%)	94.8

Table 3.1.2: Practice characteristics

Characteristic	**GP participants**
Practice setting (%)	(N = 94)
Rural	21.3
Urban	73.4
Both	5.3
Organisation type (%)	(N = 97)
PHO	55.7
PCO (Primary Care Organisation)	1.0
IPA	36.1
Small independent	2.1
None of these	3.1
Not known	2.1
Practice size	
Median number GPs in practice	3.0
(Range)	(12.0)
Median number nurses in practice	3.0
(Range)	(15.0)

3.2 Primary prescribing resources

GP participants were asked what information source they used most commonly for prescribing information when writing a prescription for a patient during a consultation, and 86.9% of GPs identified *MIMS New Ethicals* (Table 3.2.1). The remaining 13.1% indicated a range of sources, including one GP for each of the following: *BNF*, PHARMAC, guidelines/data sheets, feeling they most commonly knew the information they needed or personal contacts. Six participants were unsure which source they used most commonly, perhaps indicating that they used a variety of sources.

Table 3.2.1: Most commonly used data sources when seeking prescribing information

Information need	Most commonly used source	Percent (N = 99)
To prescribe a medication immediately	*MIMS New Ethicals*	86.9
	Text sources	2.0
	BNF	1.0
	Contact for advice	1.0
	Guidelines / data sheets	1.0
	PHARMAC	1.0
	Known	1.0
	Unsure	6.1

Participating GPs were then asked if they used different sources to the one they most commonly used depending on a particular information need. Many GPs indicated that they did (Table 3.2.2), particularly where information was sought about prescribing in the areas of pregnancy (72.7%) and breastfeeding (55.6%) and where funding-related information was needed (56.6%).

Table 3.2.2: Different source to that most commonly used when seeking specific prescribing information

Specific information need	Use different source to that most commonly used (N = 99) %
Dose	34.3
Drug interactions	43.4
Adverse drug reaction	41.4
Dosing in renal impairment	49.5
Dosing in hepatic impairment	31.3
Drug use in pregnancy	72.7
Drug use in breastfeeding	55.6
Funding-related information	56.6

3.3 Frequency of use and value of standard prescribing resources

When asked about their use of common prescribing resources (e.g. *MIMS New Ethicals*, PHARMAC schedule, *BNF*, etc.), respondents indicated a range of patterns of use, which reflected their perceived value in providing the required prescribing information (Table 3.3.1).

Whilst it is important to recognise that GPs may use more than one resource, our findings indicated that the most frequently used resource for prescribing information was *MIMS New Ethicals* (identified as the *Small Book*), previously the *New Ethicals Catalogue*. When this is combined with the CD-ROM version of the same resource, which nearly one-third of doctors indicated they used, *MIMS New Ethicals* appears to be by far the most frequently used source of prescribing information for New Zealand GPs.

Table 3.3.1: Frequency of usage of standard prescribing resources

Prescribing resource	Frequency of usage (%)				
	Daily	Weekly	Monthly	Yearly	Never
MIMS / New Ethicals Small Book (N = 99)	63.6	11.1	1.0	1.0	23.2
New Ethicals Compendium (N = 99)	5.1	16.2	14.1	1.0	63.6
MIMS CD-ROM (N = 99)	20.2	4.0	4.0	0	71.7
BNF (N = 99)	9.1	9.1	24.2	15.2	42.4
PHARMAC schedule (or update) (N = 99)	13.1	15.2	39.4	10.1	22.2
bpac^{nz} (N = 98)	4.1	10.2	40.8	7.1	37.8
IPA and PHO CME guidelines (N = 99)	5.1	19.2	35.4	9.1	31.3

As well as being the most commonly used resource, the *MIMS / New Ethicals Small Book* was found to be either useful or very useful by most (82.9%) GPs who used it (Table 3.3.2). Interestingly it must be noted that although only 28.2% (row sum for Frequency of usage cells, Table 3.3.1) of GPs used the CD-ROM version of *MIMS New Ethicals*, those who did use it indicated both high daily use and a high level of usefulness (63% found it very useful). The CD-ROM was reported by its users to be the most useful standard prescribing resource.

Whilst this study showed the *New Ethicals Compendium* to be less frequently used by practitioners, the data indicated that those who used it found it useful or very useful (96.7%, Table 3.3.2). This suggests that GPs use this resource for specific reasons, such as when they know that it contains the information they require. Previously the *New Ethicals Compendium* was supplied free to GPs, but now it is an expensive resource that GPs must purchase themselves. This may be the major reason why nearly two-thirds of GPs appear to not be using it.

The majority of GPs used the PHARMAC schedule and/or updates (77.8%, Table 3.3.1), although only 48.1% of these users considered it useful or very useful (Table 3.3.2). In contrast, 63.9% of bpac^{nz} users, 72% of *BNF* users, 75% of IPAs/PHOs guideline users and 96.7% of *New Ethicals Compendium* users rated the respective prescribing resources as useful or very useful.

Table 3.3.2: Perceived usefulness of standard prescribing resources

Prescribing resource	Usefulness (%)				
	Not useful	Of limited use	Useful	Very useful	No response
MIMS / New Ethicals Small Book (N = 76)	5.3	10.5	30.3	52.6	1.3
New Ethicals Compendium (N = 31)	0	3.2	54.8	41.9	0
MIMS CD-ROM (N = 27)	0	3.7	33.3	63.0	0
BNF (N = 57)	0	26.3	31.6	40.4	1.8
PHARMAC schedule (or update) (N = 77)	22.1	29.9	35.1	13.0	0
bpac^{nz} (N = 61)	6.6	29.5	45.9	18.0	0
IPA and PHO CME guidelines (N = 68)	8.8	16.2	44.1	30.9	0

3.3.1 *Reasons for using particular information sources*

MIMS New Ethicals is the most accessible source. It is provided free to GPs nationally, with regular updates. The content is applicable to New Zealand's prescribing environment, and text (e.g. *MIMS / New Ethicals Small Book*) can easily be taken and referred to outside the individual's usual practice.

3.3.2 *Reasons for not using particular information sources*

bpac^{nz}: Over one-third of respondents who did not use bpac^{nz} (37 GPs) indicated lack of awareness as a reason for not using it as an information source, while one-sixth cited accessibility as being a deterrent (Table 3.3.3).

Table 3.3.3: Reasons for not using bpac^{nz}

Reason for not using source(s)	Percent (N = 37)
Awareness	35.1
Accessibility	16.2
No need	16.2
Habit	8.1
Information content	8.1
Ease	5.4
Unsure	5.4
Have not got around to it	2.7
Status/version	2.7

In total, 66% of the GPs thought that bpac^{nz} feedback was an important influence on their prescribing behaviour (Table 3.3.4). Of that 66% of GPs, 17.2% were specifically influenced with respect to decisions on dosage and medication, 10.9% on awareness of drug costs, 4.7% on drug choice and 3.1% on awareness of drug side effects. More generally, 15.6% thought that bpac^{nz} was a useful reference, 12.5% said that it gave further consideration to their prescribing, and 3.1% found that it made them more aware of best/recommended practice.

Table 3.3.4. bpac^{nz}'s influence on prescribing

bpac^{nz} feedback influences prescribing	Percent (N = 97)
Yes	66.0
No	34.0
Specific bpac^{nz} feedback influences	**Percent (N = 64)**
Dosage and medication	17.2
A generally useful reference	15.6
Consideration of prescriptions	12.5
Awareness of drugs and cost	10.9
Drug choice	4.7
Awareness of best practice	3.1
Evidence-based medicine	3.1
Awareness of drug side effects	3.1
Not coded	29.8

PHARMAC: Of those GP respondents who did not use PHARMAC schedules or monthly updates (N = 22), seven (31.8%) saw no use or need for them, four (22.7%) thought they were not user-friendly, and four (22.7%) considered them to be overwhelming in size and/or frequency of delivery/update (Table 3.3.5). Lack of access, incompleteness and poor structuring were cited by one GP (4.5%) respectively as barriers to usage, and one GP (4.5%) preferred to use alternative information sources to PHARMAC.

Table 3.3.5: Summary of why GPs do not use PHARMAC schedules or monthly updates

Reason for not using source(s)	Percent (N = 22)
Not useful/no need	31.8
Not user-friendly	22.7
Too overwhelming (size and/or frequency)	22.7
Lack of access	4.5
Alternatives preferred	4.5
Incomplete source	4.5
Poorly structured	4.5
Unreadable	4.5

Only one (1%) of the GPs surveyed used a personal digital assistant (PDA), so no analysis was done on this resource. However, this is a resource that is likely to be increasingly utilised over the next decade.

3.4 Frequency of use and value of medical journals for prescribing information

Two-thirds of GPs indicated that they read medical journals to assist with their prescribing decisions (Table 3.4.1). Of those GPs who read journals, the majority judged a wide range of publications as useful or very useful (Table 3.4.2).

Table 3.4.1: Frequency of use of medical journals for prescribing

Frequency	Percent (N = 99)
Daily	1.0
Weekly	10.1
Monthly	36.4
Yearly	17.2
Never	35.4

GPs listed journals that they most commonly used and rated their usefulness; these are presented in Table 3.4.2 under five publication type categories: Family medicine, Major international, GP magazines, *New Ethicals* and Other. Family medicine and *New Ethicals* were the most commonly used with 28.7% and 24.5% readership respectively (Table 3.4.2). Although the remaining publication types had lower readership, their usefulness was ranked higher; 91% found major internationals useful or very useful versus only 55.5% for family medicine. Overall, *New Ethicals* was rated highly (24.5% readership; 78.2% rating it useful or very useful). Thus the recent demise of this publication leaves a significant gap in GPs' text resources.

Table 3.4.2: Use of medical journals for prescribing

Journal	Responses (N = 94) %	Usefulness of journals for prescribing information (%)			
		Not useful at all	Of limited use	Useful	Very useful
Family medicine (N = 27)	28.7	7.4	37.0	25.9	29.6
Major international (N = 11)	11.7	0	9.1	45.5	45.5
GP magazines (N = 15)	16.0	0	20.0	60.0	20.0
New Ethicals (N = 23)	24.5	0	21.7	65.2	13.0
Other (N = 18)	19.1	5.6	11.1	38.9	44.4

When comparing the perceived usefulness of different types of journals between New Zealand graduates ('New Zealand') and non-New Zealand graduates ('Other'), the latter appeared less likely to rate family medicine journals (including the *New Zealand Medical Journal*) as useful compared with major international journals (Table 3.4.3).

Table 3.4.3: Use of medical journals for prescribing by place of graduation

New Zealand					
Journal	**Responses (N = 49) %**	**Usefulness of journals for prescribing information (%)**			
		Not useful at all	**Of limited use**	**Useful**	**Very useful**
Family medicine (N = 16)	32.7	0	37.5	31.3	31.3
Major international (N = 5)	10.2	0	20.0	20.0	60.0
GP magazines (N = 9)	18.4	0	11.1	66.7	22.2
New Ethicals (N = 10)	20.4	0	10.0	70.0	20.0
Other (N = 9)	18.4	11.1	22.2	22.2	44.4
Other					
Journal	**Responses (N = 42) %**	**Usefulness of journals for prescribing information (%)**			
		Not useful at all	**Of limited use**	**Useful**	**Very useful**
Family medicine (N = 10)	23.8	20.0	40.0	10.0	30.0
Major international (N = 5)	11.9	0	0	60.0	40.0
GP magazines (N = 5)	11.9	0	40.0	60.0	0
New Ethicals (N = 13)	31.0	0	30.8	61.5	7.7
Other (N = 9)	21.4	0	0	55.6	44.4

3.5 Use of internet resources

Study participants reported a low level of use of prescribing websites. The usage patterns of the 43.5% of GPs reporting use of websites indicated that they did so infrequently (Table 3.5.1). Only five GPs (5.1%) reported using websites daily, and 31.3% reported using them monthly or less frequently.

Among those GPs who did report website usage, the Medsafe website was the most commonly used (61.1%) (Table 3.5.2). Medsafe website users were predominantly accessing drug data sheets.

Table 3.5.1: Frequency of use of prescribing websites

Frequency	Percent (N = 99)
Daily	5.1
Weekly	7.1
Monthly	22.2
Yearly	9.1
Never	56.5

Table 3.5.2: Commonly used prescribing websites

Website*	Percent (N = 36)
Medsafe	61.1
PHARMAC	11.1
MIMS	8.3
E-medicine	8.3
Dermnet	5.6
BNF	5.6

* GP respondents' first choice website reported only.

3.5.1 *Reasons for not using internet resources*

Respondents who reported not using websites for prescribing were asked, 'Why don't you use websites for prescribing information?' The responses included: lack of time, no need to, no access, speed of internet connection/access is slow, lack of awareness, and habit.

Generally, the main themes from this group of GPs in regard to barriers to use were: lack of time to do so, inefficiency of access or no access in practice and GPs' lack of computer literacy. A small number commented on the use of the internet and the impact on patient interaction, referring in particular to the computer being a distraction to the consultation.

3.6 Medsafe

All respondents were asked about their use of Medsafe for prescribing information (Table 3.6.1); 54.5% of GPs reported using it, but the majority of users did so less frequently (31.3% monthly; 10.1% yearly).

Table 3.6.1: Frequency of use of Medsafe for prescribing

Frequency	Percent (N = 99)
Daily	7.1
Weekly	6.1
Monthly	31.3
Yearly	10.1
Never	45.5

Interestingly, non-New Zealand graduates reported using Medsafe much less than New Zealand graduates did (Table 3.6.2).

Table 3.6.2: Frequency of use of Medsafe for prescribing by place of graduation

Frequency of use of Medsafe for prescribing (%)	New Zealand (N = 54)	Other (N = 43)
Daily	9.3	4.7
Weekly	5.6	2.3
Monthly	29.6	34.9
Yearly	14.8	4.7
Never	40.7	53.5

Of the GPs who used Medsafe, approximately 70.4% found it a useful or very useful resource (Table 3.6.3). Only 5.6% felt it was not useful at all.

Table 3.6.3: Usefulness of Medsafe

Usefulness of Medsafe	Percent (N = 54)
Not useful at all	5.6
Of limited use	24.1
Useful	38.9
Very useful	31.5

Whilst it was noted above that non-New Zealand graduates appeared less likely to use Medsafe than New Zealand graduates, of those graduates from the two groups who did use Medsafe, a similar proportion found it useful overall, that is, rated it useful or very useful (Table 3.6.4). Overseas graduates tended to rate Medsafe slightly less useful than did New Zealand graduates.

Table 3.6.4: Usefulness of Medsafe by place of graduation

Usefulness of Medsafe (%)	New Zealand (N = 32)	Other (N = 20)
Not useful at all	6.3	5.0
Of limited use	25.0	25.0
Useful	28.1	50.0
Very useful	40.6	20.0

3.6.1 *Reasons for not using Medsafe*

Overall 45.5% of GPs reported not using Medsafe. Those who did not use Medsafe were asked why – their reasons for this related to a lack of: accessibility (26.2%), awareness (16.7%), need or usefulness (11.9%) and efficiency (4.8%) (Table 3.6.5). Another 11.9% preferred to use alternative information sources. One GP was not a habitual user, one cited a lack of information content, and another said that Medsafe was not user-friendly.

Table 3.6.5: Summary of why GPs do not use Medsafe

Reason for not using source(s)	Percent (N = 42)
Lack of accessibility	26.2
Lack of awareness	16.7
Alternatives preferred	11.9
No need / not useful	11.9
Efficiency	4.8
Habit	2.4
Lack of information content	2.4
Not user-friendly	2.4
Used for information only	2.4
Not coded	18.9

3.7 Practice management and internet facility

Although there is a high uptake of computerisation by general practices in New Zealand, only 52.6% of practices surveyed had become paperless (Table 3.7.1), that is, they had fully computerised/ electronic record-keeping in the practice. Of the remaining (paper) practices, there was almost complete adoption of computerised age/sex registers and very high uptake of computerised patient records, lab reporting and prescribing. The area of variation between paper and paperless practices was in the adoption of document scanning for computerised records: only 5.3% of 'paper' practices were reported to scan documents. Most of the participants had access to computerised prescribing systems (all of those from paperless practices and 89.1% of others).

Table 3.7.1: Degree of computerisation

	Yes	No
Paperless practice (N = 97) (%)	52.6	47.4
Computerised information systems in paper practices (%)		
Computerised age/sex register (N = 45)	97.8	2.2
Computerised patient records (N = 46)	76.1	23.9
Computerisation of lab reporting (N = 46)	80.4	19.6
Computerised prescribing (N = 46)	89.1	10.9
Scanned letters from hospitals/specialists (N = 38)	5.3	94.7

Four main practice management systems (PMSes) were identified as being used by the study participants. MedTech32 was the most commonly used – in nearly two-thirds of practices (Table 3.7.2) – followed by Houston, with a significantly lower proportion (11.1%).

Table 3.7.2: Practice management systems (PMSes)

PMS	Responses percent (N = 99)
MedTech32	61.6
Houston	11.1
Profile	10.1
GP Dat / Next Generation / My practice	4.0
MedCen	5.1
Other	6.0
Don't have PMS	2.0

Almost all the participants had access to the internet at home, but only 63.9% had access in their consultation rooms (Table 3.7.3). Of those, almost two-thirds (62.8%) reported using the internet for clinic-related activities.

Table 3.7.3: Internet access

Access site %	Yes	No	Internet work related to clinic activities (includes internet users only) (%)
Access at home (N = 97)	92.8	7.2	57.9 (N = 76)
Access at clinic (N = 94)	77.7	22.3	18.8 (N = 64)
Access in consulting room (N = 97)	63.9	36.1	62.8 (N = 51)

At least two-thirds of the GPs with internet access in their consulting rooms had broadband (fast internet) access there (Tables 3.7.4).

Table 3.7.4: Internet connection speed

Access site (%)	Broadband*	Slow†	Unsure
Access at home (N = 90)	26.7	61.1	12.2
Access at clinic (N = 74)	62.2	17.6	20.3
Access in consulting room (N = 63)	66.7	14.3	19.1

* Broadband covers Jetstream and Woosh.

† Slow covers 56Kb modem (plain, slow, dial-up).

A trend towards more frequent use of prescribing websites was evident among GPs with broadband internet connections, although the proportion of users overall was constant irrespective of connection speed (Table 3.7.5).

Table 3.7.5: Internet connection speed in the consulting room and frequency of use of prescribing websites

Internet connection speed	Frequency of use of prescribing websites (%)				
	Daily	Weekly	Monthly	Yearly	Never
Broadband (N = 25)	8.0	16.0	24.0	0	52.0
Slow (N = 51)	5.9	5.9	23.5	11.8	52.9
Unsure (N = 23)	0	0	17.4	13.0	69.6

3.8 Use of colleagues and other health professionals

Pharmacists were the health professionals GPs contacted most for assistance with prescribing, all being community pharmacists (Table 3.8.1). In addition, the frequency of use of pharmacists was markedly higher than that of other health professionals, with 58.6% of GPs contacting pharmacists weekly or more frequently.

Although some health professionals were contacted much more than others, all were valued by the GPs who used them.

Table 3.8.1: Frequency and usefulness of colleagues and other health professionals for prescribing

	Frequency of contact for prescribing (%)				
	Daily	Weekly	Monthly	Yearly	Never
Pharmacists (N = 99)	11.1	47.5	28.3	7.1	6.1
GP colleagues (N = 99)	8.1	40.4	31.3	13.1	7.1
Specialists (N = 98)	0	3.1	48.0	22.5	26.5
Hospital staff (N = 99)	0	17.2	49.5	18.2	15.2
Pharmacy facilitators (N = 99)	0	2.0	18.2	13.1	66.7
	Usefulness (%)				
	Not useful	Of limited use	Useful	Very useful	No response
Pharmacists (N = 93)	4.3	11.8	33.3	49.5	1.1
GP colleagues (N = 92)	2.2	7.6	29.4	60.9	0
Specialists (N = 73)	0	8.2	30.1	60.3	1.4
Hospital staff (N = 84)	0	8.3	38.1	53.6	0
Pharmacy facilitators (N = 33)	6.1	12.1	33.3	48.5	0

Those GPs who used pharmacy facilitators and found them to be useful gave reasons in support of their usefulness. The main reasons emerging were: being up to date, well informed/ knowledgeable and aware of or actively researching topics of interest. Additionally, GPs felt that pharmacy facilitators were unbiased, reliable sources of prescribing information.

GPs had the most similar views in regard to reasons for the usefulness of hospital employees (e.g. registrars or consultants). GPs predominantly included references to hospital employees being specialists in the topic/area and/or having specific subject knowledge, whether patient- or drug-specific. Generally, GPs reported good responses from hospital employees and found

hospital employees' skills and advice (e.g. about hospital-only medicines) to be required and valuable.

Reasons supporting the usefulness of consultants in private practice were, not surprisingly, very similar to those for hospital employees. Specialist knowledge and the ability to answer GPs' questions were common reasons for usefulness. In contrast to the public hospital employees, a small number of GPs commented that private consultants were more accessible / easier to get hold of.

Almost 70% of GPs reported seeing pharmaceutical representatives and 30% reported they did not.

Regarding receiving mailed or posted pharmaceutical information, 84.9% (N = 99) of GPs said that they did so daily. As for the usefulness of such information, 44.9% (N = 98) of GPs said that it was not useful at all.

3.9 Information sources GPs identified a desire to have access to

Participating GPs were all asked, 'What type of information sources or support for prescribing would you like to be more readily available to you that you are currently using?' The three source types that GPs indicated were electronic, text and support people or agencies.

Electronic sources constituted computer databases (CDs), online/internet or a combination of the two. Many GPs suggested integration of computer sources (e.g. with PMS). The benefits and advantages of having electronic sources were mainly attributed to the collation of information resources and ease of maintaining up-to-date sources. Commonly indicated information available from an electronic source was the costs of drugs and dosage. Problems with access to computer sources, particularly internet and internet speed, were an apparent barrier for many GPs, and the notion of free/funded web access and broadband (fast internet access) was discussed by several GPs.

Overall, GPs expressed a preference for a centralised information source/portal of up-to-date and reliable information that is accessible and user-friendly, via the computer. One GP summed it up as 'an online one-stop shop'.

Text sources were another common theme that emerged during the interviews. Predominantly with reference to *BNF* or *New Ethicals*, though with New *Ethicals* discussion focused on either the indexing of the new title, *MIMS New Ethicals*, or the limitations of information contained in it (e.g. the need to refer to PHARMAC schedules as well as *New Ethicals*). Thus the need for a text similar to *BNF*, but particular to New Zealand, and searchable in a logical and user-friendly way, materialised from those GPs who desired text options. The portability of text resources was seen to be a benefit, particularly if such resources contained most of the information that was required. As with those preferring electronic sources, there was a common desire to have up-to-date, accessible and reliable prescribing information. A barrier to this, although not too frequently mentioned, was cost, particularly given the need to update text editions. Some GPs disliked the pharmaceutical company advertising included in text resources.

Support contacts (agencies or individuals) were not so commonly mentioned but did emerge; this contact being for specific information either via email or phone (free phone). The support contacts suggested included largely hospital employees but were primarily pharmacists. The benefits were enabling one-to-one contact and readily accessible information that was considered up-to-date and reliable, that is, the contact could answer your question specifically without having to search any information sources.

3.10 Influences on prescribing

The cost of a drug to a patient was identified as the most substantial influence on prescribing (90% of GPs said it had some or a strong influence) (Table 3.10.1). Direct-to-consumer advertising (DTCA) was perceived as a high influence on patient expectations (76.7% of GPs said it had some or a strong influence) but much less of an influence on GPs' actual prescribing (15.2% said it had some influence).

Table 3.10.1: Influences on prescribing

Percent (N = 99)	Absolutely none	No influence	Neutral	Some influence	Strong influence
Perceived patient expectations	0	19.2	41.4	36.4	3.0
DTCA on patient expectations	1.0	6.1	16.2	53.5	23.2
DTCA on GP prescribing	30.3	27.3	27.3	15.2	0
Cost of drug to patient	2.0	3.0	5.1	35.4	54.6
Informed patient (from internet or text)	1.0	14.1	31.3	50.5	3.0

3.10.1 *Summary of other comments on factors regarding prescribing*

All participant GPs were asked about other factors impacting on prescribing. Two main factors that arose from the responses are summarised below.

1. DTCA: Many GPs were against direct-to-consumer advertising (DTCA) because it leads to false patient expectations and it is time consuming and demanding on the GP to explain that a drug is not suitable for a patient. However, a few GPs responded positively as they felt that DTCA was beneficial to patients as it assisted with drug compliance (e.g. for asthma) or got patients more involved in their care (discussing treatment options).
2. Cost of drugs: There were two main points regarding the cost of drugs that were mentioned by at least one-third of the GPs surveyed. The main points were as follows.
    a. The impact of the cost of drugs prescribed to patients and their willingness to be prescribed them. One GP felt that disparities in medical care arose from the drug subsidies and private health care. He said, 'Social economic status is a significant factor impacting on the quality of care as some patients will not have private care when it would be quicker and/or do not get treatments prescribed or do not pick them up due to the cost to them.'
    b. PHARMAC subsidies. A number of respondents felt that the changes and updates to the pharmaceutical schedule occurred too frequently, and thus it was difficult to know which were currently subsidised or had been removed. Therefore GPs were required to source and refer to that information regularly to stay up to date. Other responses regarding PHARMAC included schedule presentations to GPs, the frequency of schedule changes and how GPs could potentially be better informed of drug funding by other means.

3.11 Response to clinical cases

About 17% of GPs failed to prescribe the recommended first-line medication (thiazide diuretic or beta blocker) for treating a 75-year-old with new high blood pressure 180/85 with normal renal function and no contraindication to drugs (Table 3.11.1). Similarly a small number chose a macrolide as their drug of choice for an 8-year-old with clinical and proven *Streptococcal* throat with no suggestion of possible penicillin allergy (Table 3.11.2).

When choice and dose of anti-hypertensive and choice and duration of antibiotic were combined, just over half the GPs participating gave responses that were deemed to conform to recommended practice guidelines.

Table 3.11.1: A 75-year-old with new high blood pressure 180/85 with normal renal function and no contraindication to drugs

Choice of drug or class	Recommended practice?	Percent (N = 92)
Ace inhibitor (4*)	No	14.1
Beta blockers (5)	Yes	6.5
Diuretic (6/6.1)		77.2
Non-thiazides	No	1.1
Thiazides	Yes	76.1
Calcium channel blocker (7)	No	2.2

* Drug code – see appendix 7.3 for detail.

Table 3.11.2: An eight-year-old with clinical and proven *Streptococcal* throat with no suggestion of possible penicillin allergy

Choice of antibiotic	Recommended practice?	Percent (N = 97)	Median time (days)	Range (days)	Minimum (days)	Maximum (days)
Penicillins (1*)	Yes	89.7	10.0	10.0	4.0	14.0
Penicillins broad spectrum (1.1)	Yes	7.2	10.0	3.0	7.0	10.0
Macrolides (2)	No	3.1	10.0	1.5	8.5	10.0

* Drug code – see appendix 7.3 for detail.

Nearly half the GPs (45.5%) relied on text sources to determine which countries had chloroquine-resistant malaria (Table 3.11.3). This was considered to be problematic as this information is subject to change over time and it is unknown how frequently written texts are updated. Using text sources for information on malaria tablets for children and pregnant women is of less concern given that this information is less subject to frequent change (Tables 3.11.4 and 3.11.5).

Table 3.11.3: What sources of information would you use to determine which countries have chloroquine-resistant malaria?

Source type	Reliability (authorial judgement)	Percent (N = 90)
Text sources		45.5
BNF	–	–
New Ethicals	Poor*	11.1
New Ethicals Compendium	Poor	–
Travellers guide(s)	Good	24.4
Medical	Maybe	2.2
Travel	Maybe	7.8
Websites		22.3
General search	Good	8.9
Travel	Good	7.8
Travel medicine	Good	5.6
Government/international agencies		20.0
CDC or WHO	Good	12.2
Medsafe	Poor	–
Ministry of Health (web or handbooks/guides)	Good	7.8
Contacts		11.1
Colleague	Maybe	2.2
Ministry of Health	Good	–
Pharmaceutical representative	Poor	–
Pharmacist	Good	1.1
Specialists (including MedLab)	Good	5.6
Travel services	Good	2.2
Practice management software		1.1

* Poor – In this table, the source of information is not founded on evidence-based recommended practice.

Table 3.11.4: Where would you go to get information on malaria tablets for children?

Source type	Reliability (authorial judgement)	Percent (N = 96)
Text sources		30.1
BNF	Good	3.1
New Ethicals	Poor*	10.4
New Ethicals Compendium	Poor	1.0
Travellers guide(s)	Good	10.4
Medical	Maybe	1.0
Travel	Maybe	2.1
Paediatric medical	Good	2.1
Websites		16.6
General search	Good	3.1
Travel	Good	8.3
Travel medicine	Good	5.2
Government/international agencies		20.8
CDC or WHO	Good	10.4
Medsafe	Good	2.1
Ministry of Health (web or handbooks/guides)	Good	8.3
Contacts		31.1
Colleague	Maybe	3.1
Ministry of Health	Good	1.0
Pharmaceutical representative	Poor	1.0
Pharmacist	Good	5.2
Specialists (including MedLab)	Good	17.7
Travel services	Good	3.1
Known	Good	1.0

* Poor – In this table, the source of information is not founded on evidence-based recommended practice.

Table 3.11.5: Where would you go to get information on malaria tablets for a pregnant woman?

Source type	Reliability (authorial judgement)	Percent (N = 94)
Text sources		44.7
BNF	Good	6.4
New Ethicals	Good	4.3
New Ethicals Compendium	Good	–
Travellers guide(s)	Good	7.1
Medical	Maybe	1.2
Travel	Good	1.2
Drugs and pregnancy	Good	27.1
Websites		9.6
General search	Maybe	1.1
Travel	Good	2.1
Travel medicine	Good	6.4
Government/international agencies		18.1
CDC or WHO	Good	9.6
Medsafe	Good	2.1
Ministry of Health (web or handbooks/guides)	Good	6.4
Contacts		26.6
Colleague	Maybe	1.1
Ministry of Health	Good	–
Pharmaceutical representative	Poor*	1.1
Pharmacist	Good	5.3
Specialists (including MedLab)	Good	13.8
Travel services	Good	5.3
Known	Good	1.1

* Poor – In this table, the source of information is not founded on evidence-based recommended practice.

The proportion who were recommended practice prescribers was far greater for recent trainees from the subgroup survey (82.4%) than for the GPs in the main survey (48.5%) (Table 3.11.6). However, the sample design for the recent trainees could be a source of bias for any comparisons due to the self selection methodology used.

Table 3.11.6: Comparison of recent trainees with other GPs in relation to recommended prescribing practice

	Main survey % (N = 99)	Recent trainee survey % (N = 17)
Recommended practice prescribers	48.5	82.4
Other practice prescribers	51.5	17.7

Full-time GPs were more likely to be recommended practice prescribers (54% versus 44.7% of part-time GPs) suggesting that greater clinical experience may be influential in following recommended practice prescribing (Table 3.11.7). Practices with part-time GPs were more computerised but had similar distributions of PMS types to the other practices. Overall, full-time GPs had less access to the internet, but their internet work was more often related to clinical activities.

Table 3.11.7: Recommended practice prescribing by workload

	Part-time % (N = 47)	**Full-time % (N = 50)**
Recommended practice prescribers	44.7	54.0
Other practice prescribers	55.3	46.0

There appeared to be no difference between New Zealand graduates and non-New Zealand graduates in terms of their adherence to recommended prescribing practices (Table 3.11.8).

Table 3.11.8: Recommended practice prescribing by place of graduation

	New Zealand % (N = 54)	**Other % (N = 43)**
Recommended practice prescribers	48.1	51.2
Other practice prescribers	51.9	48.8

More frequent use of prescribing websites was shown for the recommended practice prescribers, which suggests that these websites may provide influential information (Table 3.11.9).

Table 3.11.9: Recommended practice prescribing by frequency of website use

	Frequency of prescribing website use (%)				
	Daily	**Weekly**	**Monthly**	**Yearly**	**Never**
Recommended practice prescribers (N = 48)	10.4	8.3	18.8	12.5	50.0
Other practice prescribers (N = 51)	0	5.9	25.5	5.9	62.8

More than 50% of recommended practice prescribers viewed pharmaceutical representatives as being of limited or no use in providing prescribing information (Table 3.11.10), although just over half (54%) of the other practice prescribers rated pharmaceutical representatives as useful or very useful. It should be noted that as well as pharmaceutical representatives visiting practices and mailing in promotional material, pharmaceutical companies also used to run CME meetings and conferences. However, over the past decade, this role has been taken over by IPAs and PHOs. Any pharmaceutical company involved in these events now is usually limited to sponsoring the meetings (usually the catering) and having the opportunity to disseminate written information about their products. They do not have input into the content of the CME sessions.

Table 3.11.10: Prescribing by usefulness of pharmaceutical representatives

	Usefulness of pharmaceutical representatives (%)			
	Not useful	Of limited use	Useful	Very useful
Recommended practice prescribers (N = 32)	9.4	50.0	31.3	9.4
Other practice prescribers (N = 37)	10.8	35.1	35.1	18.9

Interestingly, having broadband internet access in the clinic or consulting room was not a strong determinant of being a recommended practice prescriber (Table 3.11.11). The recommended practice GPs were only slightly more likely to have broadband internet access available in the general practice setting than other practice prescribers.

Table 3.11.11: Prescribing and internet connection speed

	Connection speed (%)	
	Broadband*	Slow†
Home		
Recommended practice prescribers (N = 44)	27.3	72.7
Other practice prescribers (N = 38)	39.5	60.5
Clinic		
Recommended practice prescribers (N = 31)	80.6	19.4
Other practice prescribers (N = 28)	75.0	25.0
Consulting room		
Recommended practice prescribers (N = 28)	85.7	14.3
Other practice prescribers (N = 27)	81.5	18.5

* Broadband covers Jetstream and Woosh.

† Slow covers 56Kb modem (plain, slow, dial-up).

3.12 Rural and urban practice setting

During interviews, respondents were asked whether the practice they worked for was rural or urban: 20 responded rural, 69 urban and five considered their practices to be both rural and urban. In comparing GPs from urban and rural settings, very few differences were noted in their demographics (Table 3.12.1). Urban GPs tended to work in bigger practices, with a median of four GPs per practice, compared with two for their rural colleagues (Table 3.12.2). These findings are consistent with those of the National Primary Medical Care Survey (NatMedCa) (Hider et al 2004).

Table 3.12.1: Participant characteristics by practice setting

Characteristic	GP participants (%)		
	Rural (N = 20)	Urban (N = 69)	Both (N = 5)
Gender (%)			
Male	85.0	63.8	100.0
Female	15.0	36.2	0
Age group (%)			
20–29	0	0	0
30–39	20.0	23.2	0
40–49	55.0	37.7	40.0
50–59	25.0	30.4	40.0
60–65	0	7.3	0
66 and over	0	1.5	20.0
Median time since graduation (years)	17.0	22.0	23.0
(Range)	(31.0)	(36.0)	(32.0)
Mean time in practice (years)	16.1	16.8	19.2
(Standard deviation)	(9.1)	(8.6)	(14.7)
Postgraduate training (%)			
RNZCGP/ Fellow of the RNZCGP	35.0	68.1	20.0
Other	45.0	30.4	80.0
None	20.0	1.5	0
Median number sessions per week	8.5	9.0	10.0
(Range)	(12.0)	(9.0)	(6.0)
Fully computerised (%)	45.0	55.1	40.0
Computerised prescribing (%)	95.0	95.7	80.0

Table 3.12.2: Practice characteristics by practice setting

Characteristic	GP participants (%)		
	Rural (N = 20)	Urban (N = 69)	Both (N = 5)
Organisation type (%)			
PHO	70.0	55.1	20.0
PCO (Primary Care Organisation)	0	1.5	0
IPA	30.0	33.3	80.0
Small independent	0	2.9	0
None of these	0	4.4	0
Not known	0	2.9	0
Practice size			
Median number of GPs in practice	2.5	4.0	3.0
(Range)	(11.0)	(11.0)	(9.0)
Median number of nurses in practice	2.0	3.0	2.0
(Range)	(13.0)	(15.0)	(4.0)

For both urban and rural GPs, *MIMS New Ethicals* was the most frequently used resource. None of the rural GPs used prescribing websites on a daily or weekly basis, possibly indicating a lack of high-speed connections in rural locations (Table 3.12.4). Rural GPs tended to use the MIMS CD-ROM more frequently than urban GPs, but the usage of CME guidelines and bpac^{nz} was much lower among rural GPs, particularly in regard to daily use – in fact rural showed 0% for both.

No clear differences were seen between rural and urban GPs in the use of prescribing resources, although rural GPs may have tended to use medical journals (Table 3.12.3) and websites (Table 3.12.4) less frequently than their urban colleagues.

Table 3.12.3: Frequency of use of medical journals for prescribing by practice setting

Frequency of use of medical journals for prescribing (%)	Rural (N = 20)	Urban (N = 69)
Daily	0	1.5
Weekly	0	10.1
Monthly	30.0	40.6
Yearly	25.0	15.9
Never	45.0	31.9

Although there did not appear to be a difference between rural and urban practices in the proportion of GPs who used websites, urban GPs who were users demonstrated a trend towards more frequent use of prescribing websites (Table 3.12.4).

Table 3.12.4: Frequency of use of prescribing websites by practice setting

Frequency of use of prescribing websites (%)	Rural (N = 20)	Urban (N = 69)
Daily	0	7.3
Weekly	0	10.1
Monthly	35.0	21.7
Yearly	10.0	8.7
Never	55.0	52.2

No differences were identified between rural and urban GPs in terms of prescribing in line with recommended practice (Table 3.12.5).

Table 3.12.5: Recommended practice prescribing by practice setting

Prescriber type	GP participants (%)		
	Rural (N = 20)	Urban (N = 69)	Both (N = 5)
Recommended practice prescribers	55.0	50.7	20.0
Other practice prescribers	45.0	49.3	80.0

No significant differences were found in the level of practice computerisation between rural and urban GPs, although a higher proportion of urban GPs were in paperless practices (Table 3.12.6).

Table 3.12.6: Degree of computerisation by practice setting

	GP participants (%)	
	Yes	**No**
Rural		
Paperless practice (N = 20)	45.0	55.0
Computerised information systems		
Computerised age/sex register (N = 11)	100.0	0
Computerised patient records (N = 11)	81.8	18.2
Computerisation of lab reporting (N = 11)	81.8	18.2
Computerised prescribing (N = 11)	90.9	9.1
Scanned letters from hospitals/specialists (N = 8)	12.5	87.5
Urban		
Paperless practice (N = 69)	55.1	44.9
Computerised information systems		
Computerised age/sex register (N = 30)	96.7	3.3
Computerised patient records (N = 31)	74.2	25.8
Computerisation of lab reporting (N = 31)	83.9	16.1
Computerised prescribing (N = 31)	90.3	9.7
Scanned letters from hospitals/specialists (N = 26)	3.8	96.2
Both		
Paperless practice (N = 5)	40.0	60.0
Computerised information systems		
Computerised age/sex register (N = 3)	100.0	0
Computerised patient records (N = 3)	66.7	33.3
Computerisation of lab reporting (N = 3)	33.3	66.7
Computerised prescribing (N = 3)	66.7	33.3
Scanned letters from hospitals/specialists (N = 3)	33.3	66.7

Practice Management Systems (PMSes) most commonly used by rural and urban practices were of similar proportions, with MedTech32 being the most favoured (60.9% rural; 63.9% urban). Profile (13.9% of practices) was the second most commonly used by urban practices, while MedCen (17.4%) was in second place for rural practices (Table 3.12.7).

Table 3.12.7: Practice management systems by practice setting

PMS	Responses (%)		
	Rural (N = 23)	Urban (N = 69)	Both (N = 5)
MedTech32	60.9	62.3	60.0
Houston	13.0	10.1	0
GP Dat/Next Generation	4.3	4.3	0
Profile	0	14.5	0
MedCen	17.4	1.4	0
Other	4.3	1.4	40.0
Don't have PMS	0	5.8	0

Urban GPs were much more likely than rural ones to have internet access in their consulting room and clinic (Table 3.12.8). This is consistent with their increased use of web-based prescribing sites.

Table 3.12.8: Internet access by practice setting

Access site	GP participants (%)		
	Rural (N = 20)	Urban (N = 69)	Both (N = 5)
Access at home	95.0	92.8	80.0
Access at clinic	60.0	83.6	60.0
Access in consulting room	40.0	69.6	60.0

The speed of internet connections in the consulting room by practice type was comparable, with broadband available in 75.0% and 67.4% of rural and urban practices respectively (Table 3.12.9).

Table 3.12.9: Internet connection speed in the consulting room by practice setting

Internet connection speed	Rural (N = 8) %	Urban (N = 49) %
Broadband	75.0	67.4
Slow	12.5	12.2
Unsure	12.5	20.4

3.13 Age of GP participants

In comparing the GPs by age, under 50 versus 50 years or over, the subgroup participants had very similar characteristics to the main group participants in all areas other than those affected by age, such as mean time in practice (Table 3.13.1). As might be expected, those under 50 years of age were slightly less qualified and less experienced. They worked one session less per week, were marginally more fully computerised but used computerised prescribing slightly less than the older GPs did.

Table 3.13.1: Participant characteristics by age of GP

Characteristic	GP participants (%)	
	Age <50 years (N = 61)	Age ≥50 years (N = 36)
Gender (%)		
Male	67.2	75.0
Female	32.8	25.0
Median time since graduation (years)	17.0	30.0
(Range)	(21.0)	(37.0)
Mean time in practice (years)	11.8	24.9
(Standard deviation)	(5.4)	(7.5)
Postgraduate training (%)		
RNZCGP / Fellow of the RNZCGP	57.4	63.9
Other	34.4	36.1
None	8.2	0
Median number sessions per week	8.0	9.0
(Range)	(12.0)	(13.0)
Fully computerised (%)	55.7	47.2
Computerised prescribing (%)	93.4	97.2

There was a higher number of young GPs (less than 50 years old) working within rural providers, 25.4% compared with 14.3% (Table 3.13.2). The 50 or older age group had a larger median workforce: four GPs and 3.5 practice nurses compared to three and three respectively for the under 50-year-olds.

Table 3.13.2: Practice characteristics by age of GP

Characteristic	GP participants (%)	
	Age <50 years (N = 61)	Age ≥50 years (N = 36)
Practice setting (%)		
Rural	25.4	14.3
Urban	71.2	77.1
Both	3.4	8.6
Organisation type (%)		
PHO	55.7	55.6
PCO (Primary Care Organisation)	0	30.6
IPA	39.3	2.8
Small independent	1.6	5.6
None of these	1.6	2.8
Not known	1.6	2.8
Practice size		
Median number GPs in practice	3.0	4.0
(Range)	(12.0)	(11.0)
Median number nurses in practice	3.0	3.5
(Range)	(14.0)	(14.0)

The table below shows the frequency of use of information resources (Table 3.13.3). Younger GPs used the *MIMS / New Ethicals Small Book*, *BNF* and guidelines more frequently than their older counterparts. They also were much more likely to use the electronic information, in the form of the MIMS CD-ROM on a daily basis. However, the opposite applied for use of the *New Ethicals Compendium* (1.6% and 11.1%, <50 years and ≥50 respectively).

Table 3.13.3: Frequency of use of standard prescribing resources by age of GP

Prescribing resource	Frequency of usage (%)				
	Daily	**Weekly**	**Monthly**	**Yearly**	**Never**
Age <50 years					
MIMS / New Ethicals Small Book (N = 61)	68.9	6.6	0	1.6	23.0
New Ethicals Compendium (N = 61)	1.6	14.8	16.4	1.6	65.6
MIMS CD-ROM (N = 61)	24.6	1.6	3.3	0	70.5
BNF (N = 61)	14.8	6.6	18.0	13.1	47.5
PHARMAC schedule (or update) (N = 61)	9.8	13.1	37.7	13.1	26.2
bpac^{nz} (N = 61)	4.9	3.3	37.7	9.8	44.3
IPA and PHO CME guidelines (N = 61)	6.6	21.3	36.1	9.8	26.2
Age ≥50 years					
MIMS / New Ethicals Small Book (N = 36)	52.8	19.4	2.8	0	25.0
New Ethicals Compendium (N = 36)	11.1	19.4	11.1	0	58.3
MIMS CD-ROM (N = 36)	13.9	8.3	5.6	0	72.2
BNF (N = 36)	0	8.3	36.1	19.4	36.1
PHARMAC schedule (or update) (N = 36)	16.7	16.7	44.4	5.6	16.7
bpac^{nz} (N = 35)	2.8	19.4	44.4	2.8	30.6
IPA and PHO CME guidelines (N = 36)	2.8	16.7	33.3	8.3	38.9

The table below shows the perceived usefulness of information resources by age of GP (Table 3.13.4).

Table 3.13.4: Usefulness of standard prescribing resources by age of GP

Prescribing resource	Usefulness of prescribing resource (%)			
	Not useful at all	Of limited use	Useful	Very useful
Age <50 years				
MIMS / New Ethicals Small Book (N = 46)	4.3	13.0	41.3	41.3
New Ethicals Compendium (N = 21)	0	5.6	66.7	27.8
MIMS CD-ROM (N = 18)	0	5.6	27.8	66.7
BNF (N = 30)	0	20.0	36.7	43.3
PHARMAC schedule (or update) (N = 45)	22.2	37.8	31.1	8.9
bpac^{nz} (N = 34)	8.8	29.4	35.3	26.5
IPA and PHO CME guidelines (N = 45)	13.3	13.3	48.9	24.4
Age ≥50 years				
MIMS / New Ethicals Small Book (N = 27)	7.4	7.4	14.8	70.4
New Ethicals Compendium (N = 15)	0	0	38.5	61.5
MIMS CD-ROM (N = 10)	0	0	44.4	55.6
BNF (N = 22)	0	40.9	27.3	31.8
PHARMAC schedule (or update) (N = 30)	23.3	20.0	40.0	16.7
bpac^{nz} (N = 11)	7.7	26.9	57.7	7.7
IPA and PHO CME guidelines (N = 22)	0	18.2	36.4	45.5

Older GPs tended to use medical journals to inform their prescribing more frequently than younger GPs, with 16.7% versus 6.6% using them daily or weekly, and overall the older GPs found medical journals more useful than did younger GPs (Table 3.13.5). Medical journals could be considered to be a more traditional mode of transmitting knowledge, pre-dating the comparatively recent advent of electronic modes.

Table 3.13.5: Frequency of use of medical journals for prescribing by age of GP

Frequency of use of medical journals for prescribing (%)	Age <50 years (N = 61)	Age ≥50 years (N = 36)
Daily	0	2.8
Weekly	6.6	13.9
Monthly	36.1	36.1
Yearly	14.8	22.2
Never	42.6	25.0

Overall, the pattern of journal use was remarkably consistent between GPs aged 50 years and older and their younger counterparts. Family medicine journals were the most popular category for both groups, followed by the now discontinued *New Ethicals Journal* (Table 3.13.6).

Table 3.13.6: Usefulness of medical journals for prescribing by age of GP

Journal	Responses (N = 49) %	Usefulness of journals for prescribing information (%)			
		Not useful at all	Of limited use	Useful	Very useful
Age <50 years					
Family medicine (N = 15)	30.6	6.7	40.0	13.3	40.0
Major international (N = 4)	8.2	0	25.0	25.0	50.0
GP magazines (N = 8)	16.3	0	37.5	50.0	12.5
New Ethicals (N = 13)	26.5	0	23.1	69.2	7.7
Other (N = 9)	18.4	11.1	11.1	55.6	22.2
Age ≥50 years					
Family medicine (N = 11)	26.2	9.1	36.4	36.4	18.2
Major international (N = 6)	14.3	0	0	50.0	50.0
GP magazines (N = 6)	14.3	0	0	83.3	16.7
New Ethicals (N = 10)	23.8	0	20.0	60.0	20.0
Other (N = 9)	21.4	0	11.1	55.6	33.3

Younger GPs used prescribing websites more frequently than their older colleagues on a daily basis (6.6% versus 2.8% (Table 3.13.7)). This may reflect a greater familiarity with computer and internet technologies, although it must be noted that the proportion that reported never using prescribing websites was the same for both age groups, only the frequency of use differed. The pattern of use of different websites did not appear to differ substantially between the age groups.

Table 3.13.7: Frequency of use of prescribing websites by age of GP

Frequency of use of prescribing websites (%)	Age <50 years (N = 61)	Age ≥50 years (N = 36)
Daily	6.6	2.8
Weekly	4.9	11.1
Monthly	23.0	22.2
Yearly	9.8	8.3
Never	55.7	55.6

Of those who used Medsafe, the older GPs appeared to place more value on it as a resource – 79% of GPs 50 years or older rated it as useful or very useful compared with 63.6% of GPs less than 50 years of age (Table 3.13.8).

Table 3.13.8: Usefulness of Medsafe by age of GP

Usefulness of Medsafe (%)	Age <50 years (N = 33)	Age ≥50 years (N = 19)
Not useful at all	6.1	5.3
Of limited use	30.3	15.8
Useful	39.4	31.6
Very useful	24.2	47.4

There was a trend for more young GPs to be recommended practice prescribers (57.4%) than GPs over 50 years of age (36.1%) (Table 3.13.9).

Table 3.13.9: Recommended practice prescribing by age of GP

	Age <50 years (N = 61) %	Age ≥50 years (N = 36) %
Recommended practice prescribers	57.4	36.1
Other prescribers	42.6	63.9

No significant differences were seen in the computerisation of practices, the choice of practice management system or internet access in the home or clinic, although internet access in the consulting room appeared to be more common in the group of GPs 50 years of age or older.

Regarding access to the internet, comparisons by age (Table 3.13.10) showed no significant differences at home or in the clinic, while in the consulting room those 50 years and over had more access (approximately 9% difference).

Table 3.13.10: Internet access by age of GP

Access site (%)	Yes	No	Internet work related to clinic activities (includes internet users only)
Age <50 years			
Access at home (N = 61)	93.4	6.6	52.6 (N = 57)
Access at clinic (N = 60)	75.0	25.0	11.1 (N = 45)
Access in consulting room (N = 61)	60.7	39.3	56.8 (N = 37)
Age ≥50 years			
Access at home (N = 36)	91.7	8.3	42.4 (N = 33)
Access at clinic (N = 34)	82.4	17.6	25.0 (N = 28)
Access in consulting room (N = 36)	69.4	30.6	44.0 (N = 25)

3.14 Workload: participant and practice characteristics

Part-time GPs tended to be younger than full-time GPs; they had graduated more recently and consequently spent fewer years in practice (Table 3.14.1). Part-time GPs were also more likely than full-time GPs to be affiliated to the RNZCGP and to be employed by a practice with a high level of computerisation.

Table 3.14.1: Participant characteristics by workload

Characteristic	Part-time (N = 47)	Full-time (N = 50)
Gender (%)		
Male	48.8	89.9
Female	51.2	11.1
Age group (%)		
20–29	0	0
30–39	24.4	15.6
40–49	48.8	42.2
50–59	19.5	33.3
60–65	7.3	4.4
66 and over	0	4.4
Median time since graduation (years)	18.0	22.0
(Range)	(33.0)	(40.0)
Mean time in practice (years)	15.7	17.0
(Standard deviation)	(8.0)	(9.4)
Postgraduate training (%)		
RNZCGP / Fellow of the RNZCGP	80.5	42.2
Other	14.6	51.1
None	4.9	6.7
Median number sessions per week	7.0	10.0
(Range)	(7.0)	(5.0)
Fully computerised (%)	59.6	46.0
Computerised prescribing (%)	97.9	92.0

Part-time and full-time GPs' practice setting characteristics were very similar, with no substantial differences noticed (Table 3.14.2).

Table 3.14.2: Practice characteristics by workload

Characteristic	Part-time (N = 45)	Full-time (N = 49)
Practice setting (%)		
Rural	22.2	20.4
Urban	75.6	71.4
Both	2.2	8.2
Organisation type (%)		
PHO	59.6	52.0
PCO (Primary Care Organisation)	0	2.0
IPA	36.2	36.0
Small independent	2.1	2.0
None of these	0	6.0
Not known	2.1	2.0
Practice size		
Median number of GPs in practice	4.0	3.0
(Range)	(11.0)	(14.0)
Median number of nurses in practice	3.0	3.0
(Range)	(13.0)	(15.0)

No other notable differences were identified in the pattern of use of prescribing resources, whether text, internet, or journal-based.

3.15 Gender of GP participants

The following section compares prescribing information source use and value placed on information sources, by gender.

Little difference was evident in sources preferred when information was required immediately; the most common source was *MIMS New Ethicals*, with 83.8% of males and 93.1% of females indicating this as the preferred information source (Table 3.15.1).

Table 3.15.1: Most commonly used sources when seeking prescribing information by gender of GP

Information need	Most commonly used source	Male (N = 68) %	Female (N = 29) %
To prescribe a medication immediately	*MIMS New Ethicals*	83.8	93.1
	Text sources	2.9	0
	BNF	1.5	0
	Contact for advice	1.5	0
	PHARMAC	1.5	0
	Guidelines / data sheets	0	3.5
	Known	1.5	0
	Unsure	7.4	3.5

Variability in information sources used for prescribing under differing circumstances and specific needs by gender was overall similar, although interestingly, females tended to rely on their primary information source more than males (79.3% of females versus 60.3% of males), who tended to use a variety of sources depending on their specific information need (Table 3.15.2).

Table 3.15.2: Different source to that most commonly used when seeking specific prescribing information

Specific information need	Use different source to that most commonly used (%)	
	Male (N = 68)	Female (N = 29)
Dose	39.7	20.7
Drug interactions	44.1	41.4
Adverse drug reaction	41.2	44.8
Dosing in renal impairment	50.0	48.3
Dosing in hepatic impairment	32.3	31.0
Drug use in pregnancy	70.6	75.9
Drug use in breastfeeding	52.9	58.6
Funding-related information	55.9	55.2

Whilst it is difficult to draw conclusions from subgroup analyses, it is interesting to note that male GPs appeared to look up prescribing information using *MIMS / New Ethicals Small Book* and *BNF* more routinely than females – that is to say, there was a higher prevalence of daily use of these prescribing resources by males than females (Table 3.15.3). The opposite can be said for *New Ethicals Compendium*, PHARMAC schedule (or update), bpac^{nz} and IPA and PHO CME guidelines. The reasons for this are unclear.

Table 3.15.3: Frequency of usage of standard prescribing resources by gender of GP

Prescribing resource	Frequency of usage (%)				
	Daily	Weekly	Monthly	Yearly	Never
Males					
MIMS / New Ethicals Small Book (N = 68)	67.7	11.8	0	1.5	19.1
New Ethicals Compendium (N = 68)	2.9	17.6	17.7	1.5	60.3
MIMS CD-ROM (N = 68)	22.1	1.5	5.9	0	70.6
BNF (N = 68)	13.2	5.9	23.5	16.2	41.2
PHARMAC schedule (or update) (N = 68)	10.3	13.2	42.7	10.3	23.5
bpac^{nz} (N = 68)	1.5	10.3	44.1	7.4	36.8
IPA and PHO CME guidelines (N = 68)	2.9	16.2	36.8	10.3	33.8
Females					
MIMS / New Ethicals Small Book (N = 29)	51.7	10.3	3.5	0	34.5
New Ethicals Compendium (N = 29)	10.3	13.8	6.9	0	69.0
MIMS CD-ROM (N = 29)	17.2	10.3	0	0	72.4
BNF (N = 29)	0	10.3	27.6	13.8	48.3
PHARMAC schedule (or update) (N = 29)	17.2	17.2	34.5	10.3	20.7
bpac^{nz} (N = 28)	10.7	7.1	32.1	7.1	42.9
IPA and PHO CME guidelines (N = 29)	10.3	27.6	31.0	6.9	24.1

The pattern of contact with other health professionals for advice did not seem to differ between genders, except in the case of pharmacists who were used more on a daily basis by male GPs than by female GPs (Table 3.15.4).

Table 3.15.4: Frequency of use of colleagues and other health professionals for prescribing by gender of GP

	Frequency of contact for prescribing (%)				
	Daily	**Weekly**	**Monthly**	**Yearly**	**Never**
Male (N = 68)					
Pharmacists	13.2	45.6	25.0	8.8	7.4
GP colleagues	8.8	39.7	29.4	13.2	8.8
Specialists	0	1.5	52.9	17.7	27.9
Hospital staff	0	16.2	48.5	19.1	16.2
Pharmacy facilitators	0	1.5	17.7	16.2	64.7
Female (N = 29)					
Pharmacists	3.5	51.7	37.9	3.5	3.5
GP colleagues	6.9	37.9	37.9	13.8	3.5
Specialists	0	7.1	32.1	35.7	25.0
Hospital staff	0	17.2	51.7	17.2	13.8
Pharmacy facilitators	0	3.5	20.7	6.9	69.0

3.16 New trainees

As expected, GPs who were new trainees tended to be younger, had qualified more recently, had less experience and were less likely to have had postgraduate training with RNZCGP than the main group of GPs (reported here for comparison). However, they were similar by gender and workload (Table 3.16.1). It must be noted that due to sample size and design limitations, reliable statistical comparisons cannot be made between the two study groups and thus no firm conclusions can be drawn.

Table 3.16.1: Participant characteristics for new trainee and main sample GPs

Characteristic	Trainee GP participants (N = 17)	GP participants (N = 97)
Gender (%)		
Male	70.6	70.1
Female	29.4	29.9
Age group (%)		
20–29	0	0
30–39	41.2	20.6
40–49	52.9	42.3
50–59	5.9	29.9
60–65	0	5.2
66 and over	0	2.1
Median time since graduation (years)	18.0	21.0
(Range)	(20.0)	(40.0)
Mean time in practice (years)	7.5	16.7
(Standard deviation)	(6.4)	(8.9)
Postgraduate training (%)		
RNZCGP / Fellow of the RNZCGP	35.3	59.8
Other	58.8	35.1
None	5.9	5.2
Median number sessions per week	9.0	9.0
(Range)	(7.0)	(13.0)
Fully computerised (%)	52.9	52.6
Computerised prescribing (%)	100.0	94.8

Similar proportions of new trainees and GPs in the main group were working with rural providers, and they were working in practices of similar computerisation and size, though the umbrella organisation was more likely to be a PHO than an IPA for the new trainee GPs (Table 3.16.2).

Table 3.16.2: Practice characteristics for new trainee and main GPs

Characteristic	Trainee GP sample participants	Main GP sample participants
Practice setting (%)	(N = 17)*	(N = 94)*
Rural	23.5	21.3
Urban	70.6	73.4
Both	5.9	5.3
Organisation type (%)	(N = 17)	(N = 97)
PHO	76.5	55.7
PCO (Primary Care Organisation)	0	1.0
IPA	23.5	36.1
Small independent	0	2.1
None of these	0	3.1
Not known	0	2.1
Practice size		
Median number of GPs in practice	3.0	3.0
(Range)	(9.0)	(12.0)
Median number of nurses in practice	2.0	3.0
(Range)	(19.0)	(15.0)

* It must be noted that the two sample groups are not mutually exclusive – two GPs in the main survey, randomly selected, happened to fit the 'new trainee' criteria. Therefore these two GPs are included in both analyses presented within this section.

Regarding the frequency of use of standard information resources, new trainees used the *MIMS / New Ethicals Small Book* more frequently and more exclusively than the main group of GPs (Table 3.16.3). It is notable that new trainees had a low usage of both *New Ethicals Compendium* and bpac^{nz} information.

Table 3.16.3: Frequency of usage of standard prescribing resources for new trainee and main GPs

Prescribing resource	Frequency of usage (%)				
	Daily	Weekly	Monthly	Yearly	Never
Trainee GP sample participants (N = 17)*					
MIMS / New Ethicals Small Book	88.2	5.9	0	5.9	0
New Ethicals Compendium	0	17.7	11.7	0	70.6
MIMS CD-ROM	11.8	0	0	0	88.2
BNF	17.7	35.3	11.8	0	35.3
PHARMAC schedule (or update)	5.9	35.3	23.5	0	35.3
bpac^{nz}	5.9	0	35.3	0	58.8
IPA and PHO CME guidelines	5.9	23.5	47.1	0	23.5
Main GP sample participants					
MIMS / New Ethicals Small Book (N = 99)*	63.6	11.1	1.0	1.0	23.2
New Ethicals Compendium (N = 99)	5.1	16.2	14.1	1.0	63.6
MIMS CD-ROM (N = 99)	20.2	4.0	4.0	0	71.7
BNF (N = 99)	9.1	9.1	24.2	15.2	42.4
PHARMAC schedule (or update) (N = 99)	13.1	15.2	39.4	10.1	22.2
bpac^{nz} (N = 98)	4.1	10.2	40.8	7.1	37.8
IPA and PHO CME guidelines (N = 99)	5.1	19.2	35.4	9.1	31.3

* It must be noted that the two sample groups are not mutually exclusive – two GPs in the main survey, randomly selected, happened to fit the 'new trainee' criteria. Therefore these two GPs are included in both analyses presented within this section.

There was some evidence that new trainees were more likely than the GPs in the main group to use journals as a source of prescribing information, but the frequency of use was quite low for both groups (Table 3.16.4).

Table 3.16.4: Frequency of use of medical journals for prescribing for new trainee and main GPs

Frequency (%)	Trainee GP sample participants (N = 17)*	Main GP sample participants (N = 99)*
Daily	5.9	1.0
Weekly	5.9	10.1
Monthly	58.8	36.4
Yearly	5.9	17.2
Never	23.5	35.4

* It must be noted that the two sample groups are not mutually exclusive – two GPs in the main survey, randomly selected, happened to fit the 'new trainee' criteria. Therefore these two GPs are included in both analyses presented within this section.

There was some evidence that new trainees used prescribing websites more frequently than the main group of GPs (Table 3.16.5 compared with Table 3.5.1), as was the finding for younger GPs versus older GPs (see above). The Medsafe website was the most used internet resource by both sample groups.

Table 3.16.5: Frequency of use of prescribing websites for new trainees

Frequency (%)	Trainee GP sample participants (N = 17)*	Main GP sample participants (N = 99)*
Daily	5.9	5.1
Weekly	23.5	7.1
Monthly	17.7	22.2
Yearly	5.9	9.1
Never	47.1	56.5

* It must be noted that the two sample groups are not mutually exclusive – two GPs in the main survey, randomly selected, happened to fit the 'new trainee' criteria. Therefore these two GPs are included in both analyses presented within this section.

Medsafe use, including website, was more common on a daily basis for GPs in the main sample than that of trainee GPs, 7.1% verses 5.9% respectively (Table 3.16.6). However, weekly the reverse could be said, with 11.8 % trainee GPs using Medsafe weekly compared to 6.1% of GPs that are not trainees.

Table 3.16.6: Frequency of use of Medsafe for prescribing for new trainee and main GPs

Frequency (%)	Trainee GP sample participants (N = 17)*	Main GP sample participants (N = 99)*
Daily	5.9	7.1
Weekly	11.8	6.1
Monthly	35.3	31.3
Yearly	0	10.1
Never	47.1	45.5

* It must be noted that the two sample groups are not mutually exclusive – two GPs in the main survey, randomly selected, happened to fit the 'new trainee' criteria. Therefore these two GPs are included in both analyses presented within this section.

Although new trainees were more likely to have internet access at home, they were less likely to have that facility in the clinic or consulting room (Table 3.16.7).

Table 3.16.7: Internet access for new trainees

Access site % (N = 17)*	Yes	No
Trainee GP sample participants		
Access at home	100.0	0
Access at clinic	64.7	35.3
Access in consulting room	47.1	52.9
Main GP sample participants		
Access at home (N = 97)*	92.8	7.2
Access at clinic (N = 94)	77.7	22.3
Access in consulting room (N = 97)	63.9	36.1

* It must be noted that the two sample groups are not mutually exclusive – two GPs in the main survey, randomly selected, happened to fit the 'new trainee' criteria. Therefore these two GPs are included in both analyses presented within this section.

4 Discussion

This survey set out to establish the sources that GPs use to inform themselves on prescribing decisions; to describe how they keep their knowledge up to date and establish other possible factors that might influence their prescribing decisions. The main random sample of GPs (main survey) was similar in participant characteristics (e.g. gender, proportion rural, PHO and/or IPA status) to other national survey samples of GPs.

4.1 Prescribing sources used by GPs

The most commonly used source of prescribing information was the *MIMS New Ethicals* drug information book with most GPs viewing this as a very useful resource. It was the most commonly used source for immediate prescription, and specifically for information on drug dosage, drug interaction and adverse reactions. Other sources tended to be accessed for information about complex prescribing situations, such as hepatic impairment and the use of medications in pregnancy. The *BNF* was used as a source of drug prescribing information by 57.6% of the surveyed GPs, of which 72% considered it useful or very useful.

Other written sources of information included PHARMAC, bpac^{nz}, Medsafe, IPA/PHO and pharmaceutical information. While many GPs used the PHARMAC schedule, many found it to be of no or limited use. This may be largely due to its content, which is about drug cost, and the frequency of revisions/updates, as drug subsidy information is not readily available elsewhere and GPs have reported the cost of drugs to the patient to be a significant influence on their prescribing. The surveyed GPs reported the PHARMAC schedule to be not user-friendly, overwhelming in size and/or frequency of delivery/schedule updates.

Medsafe web-based information (particularly data sheets) was accessed by 54.5% of GPs surveyed. It was considered a useful resource by 70.4% of those GPs who did use it. IPA/PHO-based information was used by 68.8% of GPs surveyed, and 75% of them felt that this information was useful or very useful.

bpac^{nz}, a national educational service for GPs, was not used at all by more than one-third of GPs, and was used at most on a monthly basis by almost half of those who did use it; but it was felt to be useful or very useful by 63.9% of its users. It should be noted that bpac^{nz} only took over the national role of educating GPs from PreMeC within the last two years. Prior to that, bpac^{nz}'s work was restricted to Otago-based GPs, which may help to explain why it had relatively little use by GPs in this survey. It is important that it does not replicate functions already provided by IPAs and PHOs. The personalised prescribing reports produced for GPs by bpac^{nz} compare an individual's prescribing behaviour, including costs, to that of the average New Zealand GP. This feedback may influence future prescribing patterns.

internet sources of prescribing information were used by 43.5% of the surveyed GPs. Those who used them did so fairly infrequently. Overall, use of the internet for prescribing information is increasing. A study by Cullen in 2002 found that just over one-third of GPs sought prescribing information through the web (Cullen 2002). The internet is likely to become the primary resource of choice as GPs become more computer literate and fast internet connections make accessing information through this source a reasonable option. A recent study indicates that the internet is under-utilised as an information source by rural GPs in New Zealand (Janes et al 2004), but usage is likely to improve as access costs reduce and speeds improve.

While the use of Personal Digital Assistants (PDAs) did not feature significantly in our findings, the use of PDAs in clinical care is a rapidly developing area. Hand-held computers are starting to be used in both primary and hospital-based settings. Within a few years, the combining of cellphone and PDA technology will allow GPs to have mobile access to the internet and to electronically stored information such as prescribing information as well as patients' clinical records.

People contacted as sources of prescribing information included pharmacists, GP colleagues, hospital staff and private specialists. Pharmacists were used for advice at least weekly by 58.6% of GPs surveyed, and they were felt to be useful or very useful by 82.8% of those. GP colleagues were commonly accessed on a weekly basis and were commonly felt to be very useful. Hospital staff were accessed less frequently, most commonly monthly or yearly, but were judged to be very useful when they were approached. Private specialists were accessed less often again but were still felt to be very useful when used for prescribing advice. Pharmacists and GP colleagues were the health professionals used most often by the GPs. Pharmacy facilitators were the least often used, maybe because they are not seen as a ready source of prescribing information. Like all the others, though, they were regarded as a useful source when used by GPs. This is in keeping with the literature where GPs like to use human sources to answer their questions (Avorn et al 1982, McGettigan et al 2001). Given this reliance on other professionals for information, it is important that these professionals, such as community pharmacists, are also receiving continuing education to ensure that they are up-to-date, reliable sources of knowledge.

The literature review indicated that immediate accessibility was a key factor in determining information sources used by GPs to answer clinical questions (Ely et al 2000, Cullen 1997). Sources that are rapidly available are more likely to be used than those that may be of higher quality but are too slow to access for the time-strapped GP needing to make a clinical decision. It would thus be expected that the *MIMS / New Ethicals Small Book*, which is usually at hand on the consulting desk, would be the most favoured resource on a day-to-day basis.

This high use of *MIMS New Ethicals* was consistent with the anecdotal expectations of the investigators. As well as being easily accessible (it is supplied free to all New Zealand GPs), it is a New Zealand-oriented publication that is up to date and reasonably comprehensive. It is used predominantly for establishing correct dosage and less frequently for information about drug interactions, adverse reactions and hepatic or renal impairment.

It was interesting to note that many GP respondents referred to an Australian Pregnancy text (supplied by the Royal Women's Hospital) as the preferred publication source for pregnancy information. The pregnancy text is believed to be that of Australian Drug Evaluation Committee, *Prescribing medicines in pregnancy: An Australian categorisation of risk of drug use in pregnancy,* (prepared by the Medicines in Pregnancy Working Party of the Australian Drug Evaluation Committee (printing partially funded by the Pharmaceutical Education Program)). In addition, GPs also expressed a high need for a source of breastfeeding information. We speculate that as there is no specific section for breastfeeding and pregnancy in the *Prescribing medicines in pregnancy* text that GPs may not feel confident that these issues are dealt with adequately. This is potentially an issue for drug interactions, renal/liver impairment and adverse effects.

The *New Ethicals Compendium* was previously a free and relatively up-to-date source of New Zealand-orientated information on adverse reactions, drug interactions and drug use with hepatic or renal impairment. Two-thirds of the GPs surveyed were not using it at all, and those who were used it infrequently, although they did judge it to be a very helpful resource. This probably reflects the fact that this resource is now one that GPs have to purchase themselves at great expense; is a cumbersome, single-volume, large, hard-backed book rather than two small lighter volumes (as in earlier editions); and requires considerable financial commitment to update regularly. It is unknown whether those few GPs using it were relying on their older free versions or had purchased the most recent publication.

Our study took place soon after the standard twice-yearly *New Ethicals Small Book* had been replaced by the *MIMS / New Ethicals Small Book* (first issued in May 2004). There are a number of differences between these two publications: the latter is organised by therapeutic category rather than alphabetically by drug, with generic drugs listed alphabetically within each category and respective brands listed under the generic entry. In our opinion, the layout and formatting of the new version is less user-friendly. For example, for information on a drug with an unfamiliar brand name the GP is required to first consult the index, and this added step is more time consuming. Furthermore, the *MIMS / New Ethicals Small Book* omits a number of databases of information that were available in the previous publication, such as calculation of paediatric dosages and information for the international traveller (immunisations required, countries with chloroquine-resistant malaria), and hence GPs are now requesting an alternative source for this information.

The New Zealand Guidelines Group (NZGG) provides a considerable amount of information on the ways and means to source and search for decision support information that is evidence-based and reliable. The NZGG's information, though mostly anecdotal, is consistent with the findings of this research and the resulting implications, that is, there is no single source with all the required information that is accessible and reliable. Thus, NZGG suggests a search strategy to locate the information desired to inform decisions and best practice. Additionally, it appreciates the inefficiency of having to search paper texts.

4.2 How GPs keep up to date

Medical journals were not frequently used on a daily or weekly basis. This is to be expected, as journals are more likely to have an intermittent influence on long-term prescribing. It is worth noting that the *New Ethicals Journal* was considered to be useful or very useful by 78.2% of its readers. Now that this is not being published, there may be scope for a new publication, ideally one not dependent on pharmaceutical co-funding. This could be a role for a group like bpac^{nz}.

There is a very high use of computers in general practice overall. There may have been some confusion over what was meant by a 'paperless' office in the survey interview as 14 GPs said that their practice was not paperless but reported that it had all of the 'computerised information systems' that are indicative of a paperless office – some GPs may have interpreted 'paperless' as meaning literally having no paper at all. However, this was accounted for in analyses; if all the computerised information systems were present, the practice was deemed paperless.

The use of prescribing websites was low. Participants' reasons for not using prescribing websites were predominantly internet access problems, including connection speed and time. It was interesting that the Medsafe website was the most commonly used (when one was used), and we speculate that it is mainly used for complex or specific information. Most practitioners found it useful or very useful when they did access it. It should be noted, however, that while the data sheets on the Medsafe website are comprehensive, the site only has data sheets for a selection of prescribed medications.

More GPs had access to the internet at home than in the clinic or consulting room. While GPs may be using Practice Management Systems for patient records and prescribing, this may not translate into having the skills to use electronic resources to update their knowledge.

A major advantage of electronic resources is that they can easily be updated regularly, whereas paper-based texts need replacing as newer versions are published. Furthermore, the interactivity available in some web-based resources allows a degree of flexibility unobtainable when relying on hard copy material. For example, with MIMS Online, the interaction of combinations of any two or more drugs can be accessed in a way not available in paper-based resources. However, GPs may need training to use electronic resources appropriately. The five criteria of Connelly and colleagues for assessing information sources are: credibility, availability, searchability, understandability and applicability (Connelly et al 1990). GPs need to be able to critically appraise the sources of information they use. It may be slower to access information from the web than from a well-known text. However, the information may be more rapidly available if there is seamless access through the PMS, if the GP has developed the necessary computer-literacy and if fast internet access is available. Useful internet sites allow for easy electronic searching and provide easily digested summarised information in a user-friendly format. For drug availability and funding information, it is necessary to use New Zealand-orientated resources.

4.3 Other factors influencing GP prescribing decisions

Influences on prescribing were felt to be a combination of patient factors and cost to patients. GPs did not often feel DTCA had a significant impact on their prescribing, but they did acknowledge that it was a factor that influenced patients' expectations of prescribing. Perceived patient expectations in themselves were felt to have at least some influence (39.4%) on prescribing. Drug costs to the patient were often felt to have some or a strong influence on prescribing.

Internet connection speeds had little impact on GPs' prescribing practice, but a slightly greater number of GPs that followed recommended practice guidelines had a broadband (fast access) internet connection in the clinic or consulting room. Specifically, within the consulting room 85.7% of recommended practice prescribers (best practice) had broadband access while 81.5% of other practice prescribers had broadband access. More GPs had access to the internet at home than in the consulting room. Those with broadband in their consulting room were more likely to use websites daily/weekly versus monthly/yearly than those without.

The relatively low level of usefulness that GPs saw in the PHARMAC schedule may have been due to GPs considering it not to be a good prescribing document, which it was not designed to be (i.e. it does not help inform the decision of treatment required). As its role is as a guide to pharmaceutical funding, however, this in many instances is considered to be one of the most significant factors that impact on the prescribing decision. Comprehensibility, availability and applicability of sources are important to their perceived usefulness (Connelly et al 1990). Publication of drug funding information might be more accessible if it were combined with other resources more commonly used and valued, or integrated with PMSes. More qualitative work may help us fully understand why GPs do not find the PHARMAC schedule useful.

In terms of influence on prescribing, most GPs thought that DTCA had an influence on prescribing in general but a lower effect on their own prescribing. We assume from this that most feel they are able to resist the influence of DTCA. Given the rise in prescribing of DTCA items, we feel that this is unlikely. The respondents thought that DTCA was a greater influence than a patient who was 'uninformed'.

The fact that the cost of drugs to the patient was considered to be a major influence suggests that this is a predominant factor in New Zealand prescribing. Other authors have found that

socioeconomic status is important to prescribing (Scott et al 1996). This highlights the need to reduce the barrier of the cost of drugs to the patient. This would facilitate recommended practice prescribing and remove disparities in primary health care.

Two-thirds of the GPs reported seeing pharmaceutical representatives, and most received daily mailed pharmaceutical information, with nearly half viewing this as not providing them with useful information. While it has been shown that acquisition of information about new drugs is usually opportunistic and that the pharmaceutical industry has an impact on prescribing patterns (Prosser and Walley 2003), GPs in this study regarded industry information as not being useful. This is concordant with the knowledge that most of the information presented by the industry is not based on scientific evidence (Tuffs 2004). However, the GPs in this survey did use the industry as an information source for new medications. Even though reported usefulness was low, other authors have shown physicians' understanding of medication to be related to industry information (Avorn et al 1982), meaning that potentially GPs' views of usefulness may be discordant with impact on their prescribing. It is likely that GPs underestimate the influence that pharmaceutical marketing actually has on their prescribing behaviour. Self-reported attitudes may not correlate well with actual prescribing, and further research is needed to better understand this relationship. On the other hand, about one-third of GPs do not have pharmaceutical representatives visiting them, and the markedly diminished role of drug companies in providing GP CME guidelines would suggest that industry information may be less influential on prescribing behaviour than it was in the past.

In terms of what resources they would like, a number of GPs expressed dissatisfaction with the fact that *MIMS New Ethicals* (new version) was not alphabetically indexed, which made it harder to use. Some wanted the *New Ethicals Compendium* provided free of charge, and a number wanted the *BNF*. One person found the book version of *BNF* easier to navigate than the internet version, and the investigators felt that this was a reasonable comment. A number also wanted more computer/internet-based resources.

4.4 Factors influencing best prescribing practice

Clinical cases were included to see if we could distinguish those who followed recommended practice from those who did not. We chose two unambiguous cases of initial treatment for high blood pressure (hypertension) and initial medication and duration for proven *Streptococcal* tonsillitis (Strep. throat). The New Zealand cardiovascular guidelines recommend that diuretics and beta blockers should be the first-line drugs for uncomplicated hypertension. The National Heart Foundation of New Zealand recommends 10 days of a penicillin-like medication for patients with clinical and swab-proven Strep. throat. There were surprisingly few distinguishing characteristics between those GPs who followed recommended practice (defined by their reported practice of prescribing for the scenarios designed around recommendations for the specific situations) and those who did not. Perhaps this is because GPs vary in the way they use information to solve problems. One study has indicated that there are two common types of GPs identified with respect to their prescribing sources: those who use two specific sources or have a method they applied to all situations and those who are problem-dependent, that is, they used three or more sources and sources varied depending on the presenting problem (Gerrett and Clark 1997).

The 'best practice' responses did not distinguish between those with broadband and those with dial-up internet connections either at home or in the office. There were, however, more practitioners who followed recommended treatment among the recent trainees than in the main group. This can be explained by two possibilities. Firstly, the recent trainees were part of a volunteer rather than a randomly selected group, and as such, may have been keener, better prescribers than the randomly selected group. Secondly, being closer to their formal training they may have been better informed about the recommended practice. Evidence from the literature suggests that knowledge does deteriorate over time. In general, younger doctors are more likely to follow recommended practice than older doctors (Ramsey et al 1991).

A number of respondents answered the question about using *MIMS New Ethicals* as a source for chloroquine-resistant malaria in spite of the stem question stating that this information is no longer contained in that source. We were concerned that almost half the respondents were using text-based sources for chloroquine-resistant malaria advice when this information could easily be out of date. A similar number were using either websites or government/international agencies. A minority were using 'human' contacts (e.g. Medical Officers of Health), which although likely to be accurate nevertheless would be time consuming and hence possibly not efficient.

The number of rural practitioners taking part in the survey was relatively small. Bearing this in mind, the only real difference between urban and rural practitioners was in their access to websites. This may reflect the difficulty in getting access to the internet in rural areas, as this was significantly lower in the consulting room for the rural practitioners surveyed. The rural practices were also smaller, and hence there may be an economic barrier to internet access.

The rural GPs tended to have been in practice for slightly fewer years than their urban counterparts. They were less likely to have a New Zealand qualification, and this may represent the fact that many rural doctors were trained in overseas countries. They were as likely to be using computerised prescribing but paradoxically less likely to be fully computerised.

Regarding age of GP, there was a higher proportion of younger GPs in rural practice than older GPs. The historical pattern has been for young doctors to work in rural areas, then move to cities or provincial towns when their children started high school. Slightly younger doctors (under the age of 50) reported using the *BNF* more daily, though there was little difference in weekly use. Younger doctors were slightly more likely to have a paperless practice and to electronically scan in paper reports. This may reflect their being younger and more computer literate or the fact that being younger they have 'shorter' patient records and hence the transition to a paperless practice is easier. It was surprising that internet access was less common in the consulting room among younger doctors but that they were more likely to use the internet in relation to a clinical situation in their consulting room.

Overseas-trained doctors tended to be slightly younger than New Zealand graduates, and they were more likely to be in rural practice than their local counterparts. They were also more likely to use the *BNF* and find it useful. This may reflect the presence of United Kingdom graduates who have had exposure to the *BNF* and can appreciate its qualities. Overseas graduates were more likely to think that family medicine publications (including the *New Zealand Medical Journal*) were not useful at all and to find the major international journals very useful. They were also less likely to find the *New Ethicals Journal* very useful. There was virtually no difference between overseas-GPs and New Zealand-trained GPs in regard to following recommended practice. While overseas graduates were more likely to use a prescribing website, they were less likely to have internet access in their consulting room. Ironically, they were more likely to use the internet for a clinical activity in their consulting room.

Part-time GPs tended to be slightly younger than full-time GPs, and this may explain why they were more likely to be in fully computerised practices. They were also much more likely to be

female practitioners. Part-time practitioners were more likely to consider family medicine journals and *New Ethicals Journal* of some value. They were also slightly less likely to be following recommended guidelines but more likely to have a paperless practice and to scan in paper reports. This latter fact may be explained by the fact that they are younger and working part-time and hence working in larger practices (with perhaps mainly younger GPs). Part-time practitioners were more likely to have internet access in their consulting room but less likely to use the internet in relation to clinical issues.

Male GPs were more likely to use *MIMS New Ethicals* and the *BNF* on a daily basis. They were also more likely to use a pharmacist as a source of information on a daily basis than their female counterparts. This may reflect a number of issues. Male doctors were more likely to be working full time and hence in a position to ask for information from a pharmacist on a daily basis.

It should be noted that the overall number of GPs surveyed was small and there may be differences that were not detectable with this sample size.

4.5 New trainee GPs

This group of volunteers was chosen to compensate for the lack of younger GPs in the main sample. They were more likely to use *MIMS New Ethicals* and the *BNF* than the main group. They were more likely to be in a paperless practice, and 100% had internet access at home but only 47.1% in the consulting room. In addition, they were much more likely to use websites for prescribing information than the main group. However, these differences need to be interpreted with caution because the new trainees were self-selected rather than a random sample and because a GP's age, years of practice, nature of practice (partner or employee) and degree of computer literacy are all likely to be interrelated factors.

4.6 Strengths of this survey

A multidisciplinary team, including GPs and a pharmacist, developed the instrument used in this study. The survey was informed by a comprehensive literature search and underwent extensive piloting before the final version was produced.

The sampling frame included the majority of New Zealand GPs. Random sampling and the high response rate of 72% allow the findings to be generalised to the New Zealand general practice population. In addition, direct sampling of 17 recent graduates from the RNZCGP training programme, identified from regionally based training programme lists, allowed comparisons to be made between newly-trained and established practitioners.

The use of the CATI service allowed for consistent data collection, using highly trained interviewers.

The use of clinical scenarios allowed 'recommended' ('best practice') and 'other' prescribers to be identified and correlations sought between practitioner knowledge of good practice prescribing and their knowledge and use of prescribing resources.

4.7 Limitations of this survey

The sample size precluded in-depth subgroup analyses. An extension to this survey or repeating the survey with an increased sample size and further development of study tools would allow this.

These findings are the self-reported responses of the interviewed GPs and may differ from the actual behaviour of the doctors in some aspects or under certain conditions. A small

observational sub-study to validate a sub-sample of GPs' practice habits and sources used could be done.

The potential for bias exists in that *MIMS New Ethicals* use could be over-reported because it was first in the list of resources GPs were asked about. The CATI system of interviewing does not allow for random variations in the order questions are posed in to address this. In a future survey, resources could be presented in a different order. MediMedia (NZ) Ltd (now CMPMedica (NZ) Ltd), the company that owned the database of GPs used to select participants for this survey also owns *MIMS New Ethicals*, which makes it likely that all sampled GPs do receive free copies of *MIMS New Ethicals*.

Accident and Medical (A&M) clinics were excluded from the sampling frame because they were beyond the scope of this study. However, it would also be of value to research the prescribing resources used by this group of practitioners. A separate survey of A&M practitioners would enable this group to be compared with GPs.

The 17 new trainee GPs sampled were unlikely to be representative of the general New Zealand population of new trainee GPs, and we need to be cautious not to generalise from this sub-sample.

5 Conclusions

The sample of GPs (main sample) was similar to those of other national studies of GPs. The proportion with Fellowship of The Royal New Zealand College of General Practitioners (FRNZCGP) was a little lower than expected. The median time from graduation was in the expected range. As was expected, *MIMS New Ethicals* was the most commonly used source of prescribing information. Many clinical questions are not answered because GPs regard the knowledge resources that they have as inadequate to answer them (Smith 1996, Connelly et al 1990). Scientific information of high validity/credibility is desired by GPs, but they will tend to favour information that is easily available, searchable, understandable and applicable at the expense of validity/credibility, in the belief that their critical evaluative skills will protect them from drug company bias. This is probably driven by constraints, particularly of time, resulting from the context of general practice.

5.1 Policy implications

There is no single source of prescribing information available to New Zealand GPs. What emerges from this survey as being most important is the development of a one-stop resource with fast access that is up to date, comprehensive and New Zealand-orientated. This would be one way of maintaining quality with respect to information reliability and age.

There are several approaches to developing a combined integrated prescribing resource without the expense and effort of creating an entirely new prescribing resource. PHARMAC has indicated that it will co-operate with other parties to ensure that prescriber support tools include accurate and appropriate pharmaceutical information.

Specific possibilities are listed as follows.

- *MIMS New Ethicals* is the most commonly used source of data for GPs. One option is to work with publishers to further develop its usefulness and usability. Currently it does not provide sufficient detail on pregnancy, lactation and renal and liver dysfunction. A resource with pregnancy, breastfeeding, renal/liver failure, interactions and adverse effects was indicated as being desirable to GPs – as there are very few current resources that include these. Therefore, multiple information sources (mainly texts) are required and referred to. For efficiency, a searchable electronic resource (a CD that can be updated or a web-based resource) would be ideal. MIMS Online meets most of these criteria but is a subscription-based resource. In the researchers' opinion, providing all GPs with free access to MIMS Online would give them access to such a source. Training might be required to ensure that GPs have the skill to effectively and efficiently use such a resource.
- Alternatively a companion resource covering those areas not well done by *MIMS New Ethicals* is an option. If this contained the above 'deficient' information along with information about malaria, travel health requirements and pricing (PHARMAC issues), GPs would have two sources for most of their prescribing needs. This companion resource could also be a location for the New Zealand Guidelines Group information. However, this option is only likely to be viable if it is provided free to GPs.
- There is scope for replacing the *New Ethicals Journal* in a way that is not dependent on pharmaceutical funding. For example, such an option could involve a new publication from bpac^{nz}.
- Re-indexing the *New Ethicals Catalogue* with the release of the new publication *MIMS New Ethicals* has significantly changed the usability of this source. Thus re-classifying and re-indexing the previous version may be an effective solution to maintain efficient access to desired information.

- Over-reliance on texts is concerning because it is not clear how up to date this information is, and such resources need to be renewed frequently. We see the continuing move towards use of electronic resources as desirable, but training may be required for these resources to be used appropriately.
- GPs following recommended practice were more likely to have broadband internet access available in the clinic or consulting room. There may be some merit in making this mandatory and providing some resources to ensure that it happens. Speed of access is a critical factor in GPs' choice of which resource to use, and slow internet access may preclude use of this medium. Furthermore, as many GPs indicated that the internet and electronic information sources were sources they would prefer to use, a web portal (specific website) containing relevant and reliable links with regular updates could be an effective and efficient reference for prescribing decisions. Immediate access through the PMS would enhance this feature.
- In regard to malaria and travel information, the forerunner to *MIMS New Ethicals*, the *New Ethicals Catalogue* booklet contained information on malaria prophylaxis and areas that were chloroquine-resistant. This information is no longer available in *MIMS New Ethicals*. The survey participants used a wide and unsatisfactory range of sources, many involving contacting other health professionals, to address these areas. This is a potentially time-consuming activity. There would be some advantage in recommending GPs link to a website such as WHO or CDC. This would solve the problem of not having an updated source. Having rapid internet access would further ameliorate the problem.
- A number of GPs were not aware that the *BNF* is available online (at www.bnf.org). Making this knowledge, and other reliable and valuable information sources that are not widely known, available, would be helpful to GPs. This could include advice of best practice sources and could be published and circulated annually, therefore enabling updated listings of best practice sources.
- Addressing the issue of direct-to-consumer advertising (DTCA) and its potential influence on prescribing, as well as the impact on patient-practitioner relationships and consultation time/practitioners' workload, is warranted.
- There is some support for reducing the cost of drugs to patients.
- Strategies to improve prescribing would be best to target not only GPs but pharmacists and patients as well.

5.2 Future prospects and speculations

Having given the topic consideration, the authors' views and suggestions are briefly summarised below.

1. A 'one-stop shop' concept, which sees information from bpac^{nz}, Medsafe and PHARMAC origins combined into one respected publication available through a single conduit, would make prescribing information more accessible.
2. Further research is needed to examine actual prescribing rather than reported practice.
3. Intersectoral strategies would help support prescribing, with information access targeted as well as educational strategies.
4. Information from the internet has the potential to be available and useable. Current use could be improved. Consideration is required to providing broadband (high speed) internet access to all GPs, especially rural GPs, with some form of instruction directing them to appropriate websites to increase access to quality information. This may necessitate some training in the use of the internet.
5. Web-based resources should be designed, mindful of the potential for access through Personal Digital Assistants (PDAs).

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Appendix 1: Literature review

There is an extensive body of literature on continuing medical education (CME) to keep GPs up to date in all areas, including their prescribing knowledge. There is also a large body of work on factors that may influence doctors' prescribing decisions. The major topics covered by this review are: sources of information GPs use to update their knowledge; adoption of a new drug for a specific treatment and factors beyond clinical presentation that influence GPs' prescribing patterns. Most of the research is international, but New Zealand studies are referred to where available.

1 Information sources for GPs

GPs face a considerable challenge in keeping up to date with the rapidly increasing knowledge base of medicine. Sources used by doctors to find medical knowledge include textbooks, journals and electronic databases, but it is difficult for them to find up-to-date information to match to individual patients. A review by *British Medical Journal* (*BMJ)* editor Richard Smith (Smith 1996) concluded that clinical questions with information needs regularly arise when doctors see patients; many of these questions are about drugs and are complex and multidimensional; the question is often about more than medical knowledge – doctors are looking for guidance, support, affirmation and feedback; most of the questions in a consultation go unanswered; doctors are most likely to seek answers to their questions from other doctors, although most can often be answered from electronic sources; and doctors are overwhelmed by the information that is provided to them.

A United States study of the information needs of 103 randomly selected family physicians found that 19% of clinical questions related to drug prescribing (Ely et al 2000). Of the 10 most common generic questions, three related to drug prescribing: 'What is the dose of drug X?', 'What is the drug of choice for condition X?' and 'Is drug X indicated in situation Y?' Queries about drug dose were usually pursued (85% of the time), but the other two questions were only pursued 47% and 25% of the time respectively. The amount of time spent pursuing questions about prescribing averaged 74 seconds. GPs often did not pursue their questions because they did not think that they would find useful information in the resources available to them. The most pronounced obstacles when searching for evidence-based information were: not enough time to search, failure of the resource to address the topic and multiple pieces of evidence not synthesised into a clinically useful statement (Ely et al 2002).

A 1995 literature review of 11 relevant studies concluded that GPs used information sources in the following order of frequency: colleagues, books and journals, libraries and printed or online bibliographies (Verhoeven et al 1995). Cost factors such as time and energy needed to search for information were viewed as being more important than the quality of the information source, and the most frequently used sources were those that had good availability and were easy to search through and understandable. Gerrett and Clark suggest that because of the information explosion, the difficulty for GPs is to select information rather than access it. Most use a small range of information sources that are summaries in the form of desktop sources (Gerrett and Clark 1997). When GPs use animate sources of drug information such as colleagues, consultants, drug information centres, medical information centres and hospital and community pharmacists, they tend to have two approaches. Just under one-half were 'source-dependent', that is, they mainly relied on one or two specific sources or had a method they applied to all situations, and the other half of GPs were 'problem-dependent', that is, they used three or more sources, and sources varied depending on the presenting problem. An Australian study found that GPs used 'personal formularies', that is, a limited list of medications that they use regularly and find effective and relatively free from side effects. This formulary is usually not written down; it is developed over a period of time by habit rather than rational thought and is influenced by colleagues, patients and experience. Formulary size varies with drug class and

can change over time. These formularies can also be influenced by industry promotional activities (Robertson et al 2001).

Connelly et al identified five criteria that physicians use to assess information sources: credibility, availability, searchability, understandability and applicability (Connelly et al 1990). On the basis of these criteria, Smith stated that an ideal information source is directly relevant, has valid information and can be accessed quickly with a minimum amount of work (Smith 1996). Availability and applicability both predict increased use of a knowledge resource (Connelly et al 1990).

1.1 *Written sources*

Drug reference books identified as the information source were most frequently consulted by family physicians (Connelly et al 1990). A New Zealand study of 34 Wellington GPs found that textbooks were consulted most frequently but were rated less valuable than colleagues and specialists as sources of information (Cullen 1997). Cullen found that the most commonly used textbooks by New Zealand GPs were the *Merck Manual* and Harrison's *Principles of Internal Medicine*. In making decisions to prescribe new drugs, only 17% of 107 United Kingdom GPs were influenced by peer-reviewed medical journals, whereas non-peer-reviewed journals, for example, *Pulse*, were used more frequently (Prosser et al 2003). GPs were often vague about what scientific journals they read (Jones et al 2001).

Drug and Therapeutics Bulletin (*D&TB*) was the most popular source of independent drug information for 56 United Kingdom GPs, although some perceived it to be too negative about the advantages of new drugs (Jones et al 2001). Sometimes the *British National Formulary* (*BNF*) and *Monthly Index of Medical Specialties* (*MIMS*) were used to check dose and interactions. In a retrospective Australian study of 108 GPs, sources listed as important for prescribing 'old drugs' were (in descending order of importance): *D&TB*; medical journal articles; *MIMS*; *BNF* and lastly other sources.

A study of 200 United Kingdom GPs found that although in theory they rated these sources in a similar order of importance for new drugs, in practice, no GPs had used *D&TB*, *BNF* or *MIMS* as the last source of information for any last new drugs prescribed but had relied on sources such as medical colleagues, pharmaceutical representatives, clinical meetings and journal articles (McGettigan et al 2001). In a qualitative study interviewing 18 United Kingdom GPs, several mentioned that the *BMJ* provided good information, but the independent *D&TB* was considered the best authority, with no drug company influence and no research interest (Armstrong et al 1996). In a study of 202 Swedish GPs, 69% used *FASS* (the Swedish equivalent to *Physician's Desk Reference*; it has no advertisements but lists drugs alphabetically according to their trade names) daily, and an additional 20% of GPs used it weekly (Lundborg et al 1998). Twenty-seven percent of the Swedish GPs actively read drug advertisements in medical journals weekly; 17% used the *Drug Therapy Handbook* weekly and a further 35% monthly (Lundborg et al 1998).

In a United States study of 126 family physicians, the following knowledge resources were found to be used, in descending order of frequency: *Physician's Desk Reference* (daily), other GPs, colleagues from other specialties (weekly), general medical textbooks (e.g. *Harrison's Principles of Internal Medicine*), clinical manuals (e.g. *Washington University Manual of Medical Therapeutics*, *Current Therapy*), review journal articles (monthly), pharmaceutical company representatives, subspecialty textbooks, research articles, computerised bibliographic retrieval (e.g. Medline, BRS Colleague; less than monthly) and *Index Medicus* (Connelly et al 1990).

1.2 *Internet*

The internet offers huge potential for doctors to access information. However, seeking information on the internet can be time consuming, and the amount of information available can be confusing.

A random sample of 294 New Zealand GPs in 2001 found that nearly half searched the internet on occasion for clinical information, and of GPs seeking clinical information on the internet, 37% sought drug information (Cullen 2002). Cullen interviewed 12 of these respondents and found that Medline was the most commonly accessed medical site, with many GPs also using search engines – Yahoo (56.1%), AltaVista (39.8%) and Google (21.2%). Other sites used included PubMed, *BMJ*, Cochrane and Medsafe. Information was retrieved mostly outside consultation time. A number of respondents used abstracts as a source of information on which their clinical decision-making was at least partly based, and Cullen concluded that the internet was a valuable source of information but that GPs required training in basic information literacy skills, identifying evidence-based sources and critical appraisal skills. In addition, portals are needed to guide GPs to selected resources and a document delivery service is needed so that GPs can get useful citations from Medline without delay or cost.

Easy access to evidence-based information is needed (Jadad 2000). By 1999, most New Zealand rural GPs had internet access either at home (73%) or work (39%) (Kerse et al 2001). However, a 2003 survey of 175 New Zealand rural GPs found that only one-third reported using the internet for help with patient care at least once weekly, either at home or at work or both (Janes et al 2004). In a United States study, computer applications such as CD-ROMs and the internet were used on only 2% of occasions when GPs used information sources to find answers to clinical questions (Ely et al 2000).

1.3 *Computer-assisted decision-making*

Computer-based clinical decision support systems may improve clinician performance, although a review of 68 controlled trials found that outcomes relating to prescribing issues such as drug dose determination are not consistently improved (Hunt et al 1998). Bates and his colleagues found a number of elements that were important for effective clinical decision support (Bates et al 2003). The most important of these was speed – this is the primary factor that determines user satisfaction, rating higher for user satisfaction than quality improvement aspects. Other important elements are that needs are anticipated and delivered in real time (physicians are less likely to access information if they must seek it out); systems must fit within the user's work flow; systems must have high usability (small things such as screen design can make a difference); physicians resist suggestions to stop doing something unless an alternative action is suggested; it is easier to change physicians' direction than to stop them; simple interventions work best; additional information from physicians should only be asked for when really needed and the impact of the system must be monitored and maintained.

Focus groups involving 22 Australian GPs who were users of the five most popular Australian prescribing/clinical practice software products found that desensitisation ('flag fatigue') could occur with prompts and alerts if these were either too frequent or of little clinical significance or inappropriate for particular patients (Ahearn and Kerr 2003). The GPs said that they would use electronic guidelines more if such guidelines were easier to access and search. GPs also said that training in the use of these decision-making tools was needed for them to be used fully.

2 New drug adoption by GPs

In general, the rate of uptake of new innovations, such as the inclusion of new drugs into prescribing practice, follows a bell-shaped curve. Initial use is restricted to the innovators or pioneers, followed by the early minority and then the late majority. A minority are late responders or never adopt the innovation. The innovation process is the way by which an innovation spreads from its source of invention to its ultimate users or adopters. Diffusion is the naturalistic (unplanned or spontaneous) spread of innovations – rather the opposite of proactive (planned and directed) dissemination. Introduction of a new drug usually occurs proactively by means of extensive advertising and academic detailing provided by the pharmaceutical industry. Dissemination of independent scientific data about a new drug or guidelines relating to drug use seldom enjoys an equivalent degree of financial backing. Therefore the process of uptake of evidence-based prescribing by GPs may be more by diffusion than an active dissemination following the typical marketplace model (Arroll et al 2003).

A study of 107 United Kingdom GPs from high, medium and low new drug prescribing practices found that GPs considered three main domains of evidence in evaluating new drugs (Prosser et al 2003). These were: the information itself, the credibility of the communicator and the GP's own clinical experience. Biomedical and pharmacological criteria were considered within these domains. Initial use of a new drug is on a personal 'trial' basis, and future use of the drug is strongly influenced by the initial experience of prescribing the drug to a particular patient (Ibid., Jones et al 2001) as well as obtaining information from credible sources (Prosser et al 2003).

Doctors' own assessments of what forces influence their prescribing behaviour was not found to be a reliable measure of actual influencing forces (Avorn et al 1982), and the basis of GP decision-making on new drug prescribing seemed to vary among GPs more than among consultants (Jones et al 2001).

3 Factors beyond clinical presentation that influence prescribing decisions by GPs

3.1 *Availability of information*

There is a tendency for GPs to be reactive recipients rather than active searchers of drug information. Available time and resources are critical factors here.

In a study of the information needs of a random sample of 107 United States family physicians, their mean time spent pursuing an answer to a clinical question was 118 seconds, with their median time 60 seconds (Ely et al 2000). GPs mainly use the resources that they have available to them in their offices – textbooks were most preferred, then colleagues (in their own practice and specialists or consultants) and journal articles that they have filed in the office. They tended not to use medical libraries much because of: access problems (including the amount of time involved); a lack of skill in using catalogues and databases; and difficulty in applying research literature to clinical situations (Cullen 1997). However, use of the internet is almost certainly increasing. Cullen's 2001 study of a random sample of New Zealand GPs found that they ranked the internet higher than medical libraries as a source of information (Cullen 2002).

Prosser et al's study of the influences on 107 family physicians' decisions to prescribe new drugs found that they actively searched for information on new drugs in only 5% of incidents (Prosser et al 2003). Generally, the doctors were reactive recipients of new drug information, with information acquisition being opportunistic. Objective scientific drug information was not often mentioned. In 37% of cases, the initial informant was both the only information source and the major prescribing influence. Pharmaceutical company information, especially information provided by the representative, was a very importance influence.

3.2 *Influence of drug company information*

As early information about new drugs often comes in the form of promotional material from pharmaceutical companies, and independent scientific evaluation of new drugs tends to lag behind, information from the pharmaceutical industry is likely to be the major information source when a GP first uses a new drug (Prosser et al 2003).

A qualitative study using semi-structured interviews of 107 United Kingdom GPs found that most GPs see pharmaceutical company representatives (Ibid.). Pharmaceutical representatives are viewed as convenient information sources, being up to date with access to technical knowledge and clinical research and providing information in a time-efficient manner. GPs do not favour commercial drug promotion and believe that they are able to critically appraise information provided by representatives and to resist marketing pressure. However, GPs' reasons for seeing pharmaceutical representatives are congruent with personal selling techniques used in marketing communications – techniques that aim to establish the salesperson as a legitimate and credible information source. GPs usually hear about new drugs through drug company advertising. Most GPs saw drug company representatives, and they were an important source of information – often the drug company information was the only source of information used before prescribing (Jones et al 2001).

In a retrospective Australian study, 26% of 108 GPs rated pharmaceutical representatives as an important information source for prescribing 'old' drugs, and 62% rated them as an important information source for prescribing new drugs (McGettigan et al 2001). Pharmaceutical representatives were the last source used in practice to find information about a new drug 36% of the time. The percentage of physicians who rated scientific papers as 'very important' was 62%, whereas only 20% rated pharmaceutical representatives as 'very important', and 4% rated drug advertisements as 'very important'.

However, GPs may not self-report accurately. In a United States study involving 85 family physicians, their own assessments of what forces influenced their prescribing behaviour were not reliable measures (Avorn et al 1982). Physicians' beliefs about the effectiveness of two index drug groups (cerebral vasodilators and propoxyphene) revealed the influence of commercial sources such as drug advertising and pharmaceutical representatives rather than the influence of the scientific literature. There is no recent or local (New Zealand) data on GPs' self-reporting accuracy.

A study of 1097 United Kingdom GPs found that a GP's frequent contact with a drug representative was significantly associated with a greater willingness to prescribe new drugs and to agree to a patient's request to prescribe a drug that was not clinically indicated; dissatisfaction with consultations ending in advice only; and receptiveness to drug advertisements and promotional literature from drug companies (Watkins et al 2003).

Of concern, a study by the Institute for Evidence-based Medicine of advertising material and marketing brochures disseminated to German GPs showed that about 94% of the information contained in such brochures had no basis in scientific evidence (Tuffs 2004).

A 1994 survey of 67 New Zealand GPs found that ethical guidelines setting out the relationship between pharmaceutical representatives and medical practitioners were inadequate and should be based on the need for the GP to become an unbiased promoter of patient health (Thomson et al 1994). The Medical Council of New Zealand has subsequently issued guidelines for doctors regarding gifts or inducements from drug companies (Medical Council of New Zealand 2003).

3.3 *Influence of clinical pharmacologists and pharmacists*

Clinical pharmacologists and community pharmacists probably have limited influence on GP prescribing.

In a Swedish survey of 202 GPs, although they rated information from clinical pharmacologists and pharmacists as being of high value, the GPs did not regard drug and therapy committees as potential sources from which to actively seek drug information (Lundborg et al 1998). This may be because non-commercial sources have less time and funds to spend on proactive outreach compared with commercial sources.

A review indicates that community pharmacists can influence prescribing by regularly although infrequently recommending to prescribers that they initiate, discontinue or change drug therapy – GPs usually accept and implement their suggestions (Carroll 2003).

3.4 *Influence of hospital prescribing*

GPs both in New Zealand and overseas have been shown to be influenced by hospital prescribing, with respected colleagues being influential as prescribing leaders (Jones et al 2001, Prosser et al 2003, Cullen 1997).

Medical specialists fit the definition of 'gatekeepers' (individuals who both seek information and disseminate it to a particular group of people) used by information scientists (Cullen 1997). These individuals have significant influence because of the status and authority that they carry, and they may add value to information because of their own experience and expertise. Of the three major sources that GPs most often use for information (drug reference textbooks, colleagues and specialists), the medical specialist is the only one that meets all five of the criteria of Connelly and colleagues for a good information source (credibility, availability, searchability, understandability and applicability) (Connelly et al 1990). This emphasises the importance of ensuring that medical specialists have up-to-date and reliable knowledge and that they are aware of their role in passing this knowledge on to GPs.

Cullen's study of 34 Wellington GPs found that female GPs accessed information from hospital specialists significantly less often than male GPs (Cullen 1997).

A Cochrane review found that using local opinion leaders may influence the practice of health professionals, where local opinion leaders are defined as health professionals nominated by their colleagues as being educationally influential. However, there was some uncertainty about identifying local opinion leaders and under what circumstances such people were likely to influence the practice of their peers (Thomson O'Brien et al 2000).

In the Australian study of 108 GPs, 36% rated consultant/hospital recommendation as an important information source for prescribing 'old' drugs and 69% for prescribing new drugs. Hospital colleagues were the last source used in practice to find information about a new drug 36% of the time (McGettigan et al 2001).

In a qualitative United Kingdom study of 18 GP interviews, the doctors were influenced to change their prescribing behaviour by an accumulation of cues, including consultant prescribing practice and practice partners. The elements likely to influence GP behaviour were consultants who were trusted/respected/had a good reputation and practice partners, especially new partners who were perceived to be closer to hospital practice and therefore considered to be more up to date (Armstrong et al 1996).

3.5 *Influence of personal advice versus written information*

In the study by Avorn and colleagues, 48% of GPs rated advice from colleagues as 'very important', and 20% rated advice from written pharmaceutical references as 'very important' (Avorn et al 1982).

In the Australian study of 108 GPs, sources that GPs considered useful in theory were not those used in practice – the last source used in practice to find information about a new drug was

pharmaceutical representatives 42% of the time, consultant/hospital recommendations 36% of the time, medical journal articles 9%, primary care colleagues 7% and journal advertisements 4%. Neither the *D&TB* nor the *BNF* nor *MIMS* had been used as a last source of new drug information.

The medium (that is, via people) may be more important than the message (McGettigan et al 2001). In the Swedish study, GPs said that they would like more verbal information from non-commercial sources (Lundborg et al 1998). Fourteen percent of these GPs discussed drug information with colleagues weekly. Information gained from colleagues is generally relevant and requires minimum work to access. Smith rates the validity of information from colleagues as moderate – validity may be variable, but as GPs are most likely to ask colleagues whom they respect, they probably regard this information to be of high validity (Smith 1996).

3.6 *Influence of patient requests, expectations and perceived expectations*

Implementation of evidence-based medicine is influenced by the relationships that GPs have with individual patients, their reluctance to jeopardise such relationships and their perception of patient characteristics. Sometimes GPs' decisions are influenced by their knowledge of the patient's situation, and implementation may be limited because of logistics. In one United States study, most family physicians considered that patient preferences had little influence on their prescribing decisions (Avorn et al 1982). However, the researchers concluded that patient preferences were a powerful driver.

Implementation is a fluid process (Freeman et al 2001). A United Kingdom study found that GPs' perception of patient pressure was strongly associated with prescribing (adjusted odds ratio 2.87), and perception of patient pressure was a stronger predictor than patients' actual preferences (Little et al 2004). The GPs thought that there was no or only a very slight indication for a prescription in 19% of patients who received a prescription.

In a United States study, only 2% of physicians rated patient preference as 'very important' (Avorn et al 1982). However, comments made by the family physicians indicated that patient preferences were a powerful driver.

Research also suggests that the socioeconomic status (SES) of patients influences GP prescribing (Scott et al 1996). Analysis of approximately 59,000 patient interviews in the Australian National Health Survey found that patients of high SES were less likely to receive a prescription compared with patients of low SES. Furthermore, men were less likely to receive prescriptions than women (after controlling for SES).

A study of 60 New Zealand GPs designated 'low-cost', 'medium-cost' and 'high-cost' prescribers by analysis of New Zealand Health Information Services (NZHIS) data and found that low-cost prescribers reported more general practice experience and appeared to have a more 'relaxed' attitude to medicine than 'high-cost' prescribers (Jaye and Tilyard 2002). They were more comfortable with refusing patients, responded to patient expectations with education and explanation, engaged more in counselling their patients and emphasised the importance of 'active listening' in general practice.

New Zealand is one of only two industrialised countries that permit direct-to-consumer advertising (DTCA) for pharmaceuticals. Results of a postal survey of New Zealand GPs found that 90% of respondents had had consultations specifically generated by DTCA, 79% were frequently asked by patients for DTC advertised drugs and only 10% believed that DTCA of prescription drugs was positive (Toop et al 2003). New Zealand GPs have petitioned the Minister of Health to ban the advertising of prescription drugs to patients (Kmietowicz 2003).

A North American study of 78 physicians found that 42% of patient requests were for drugs advertised to consumers. Patients who requested a prescription were more likely to receive one than patients who did not (odds ratio 8.7) (Mintzes et al 2002). Physicians were ambivalent about the choice of treatment in about 50% of cases when patients had requested advertised drugs (odds ratio 7.1) compared with 12% for drugs not requested by patients.

A further United States survey of 1080 family physicians found that the doctors were amenable to patients asking for drug information and medications but were less receptive to questions arising from DTCA (Zachry et al 2003).

3.7 *Influence of GPs' personal and professional experience*

Earlier experience of using a drug influences future use, so that feedback from the first few patients impacts on whether a GP continues using a new drug (Jones et al 2001). Personal and professional experiences may have a strong impact on whether GPs implement evidence-based medicine – particularly a GP's personal life experience or experience of hospital medicine as a student or junior doctor. Accidents, mishaps and spectacular clinical successes have been shown to directly influence subsequent practice (Freeman and Sweeney 2001).

In the qualitative United Kingdom study involving 18 GP interviews, the doctors were influenced to change their prescribing behaviour by an accumulation of cues. One of the greatest influences was the GP's personal experience of a drug or illness. Initial change was precarious and depended on reinforcement to be maintained – usually feedback from a small number of patients (Armstrong et al 1996).

In Avorn et al's United States study, 88% of family physicians rated their own training and experience as 'very important' (Avorn et al 1982).

3.8 *Influence of method of GP payment*

Change in fund arrangements in the United Kingdom has been shown to influence GP prescribing. Prescribing in general practices before and after they became fundholders was compared to see if becoming a fundholding practice affected prescribing patterns. Fundholders had a lower rate of increase of prescribing costs compared with non-fundholders (Wilson et al 1995). Both cost per item and prescribing volume tended to decrease for fundholders. The decrease in cost per item may have been associated with an increase in generic prescribing.

A United Kingdom study of 520 GPs found that low prescribers of new drugs tended to be more cost conscious than high prescribers and were more likely to use a prescribing formulary (Jacoby et al 2003).

A cross-sectional study of 405 primary care physicians in Spain found that the quality of drugs prescribed was positively associated with regulated physician training (Figueiras et al 2000). Using information from pharmaceutical representatives was associated with a higher percentage of prescriptions for drugs not included in their pharmaceutical formulary.

In New Zealand, PHARMAC uses reference pricing of pharmaceuticals to achieve a balance between access to pharmaceuticals and cost containment. PHARMAC does this by paying the same subsidy for all drugs that have the same or similar clinical therapeutic effect for treating the same or similar conditions, achieving cost containment by reimbursing drugs at the lowest price ruling for a therapeutic subgroup. PHARMAC's decision criteria include guidelines and evidence-based medicine, as well as cost containment goals (Metcalfe et al 2003). Its aim is to provide the greatest good to the population as a whole within available financial resources, and its impact on GPs is to limit drug options in order to steer prescribing decisions towards those that benefit the population as a whole. This relieves GPs of the conflict between having to advocate solely for the patient in any one consultation and still consider best treatment for the population as a whole (Moodie et al 2003).

3.9 *Influence of academic detailing and feedback programmes*

A Cochrane systematic review has found that academic detailing visits are effective in influencing prescribing behaviour, whether performed alone or in combination with other interventions. The effect is small to moderate but was deemed to be important by the authors (Thomson O'Brien et al 2002).

Soumerai and Avorn showed that scientific information can improve prescribing in the United States when information is presented in an educational outreach visit that is based on principles of behavioural science, market research and communications theory (Soumerai and Avorn 1990).

A pilot study in Belgium found that both individual visits and visits to the local quality groups by academic detailers were rated positively by GPs. Most respondents wanted to receive future visits (Habraken et al 2003). Most GPs said that there needed to be time for exchanging ideas and experiences during the visits, regardless of whether they were to individuals or local quality groups. Seventy-seven percent of GPs eligible for the individual visits made themselves available to receive two visits. Academic detailers in this study aimed to stimulate a critical attitude in GPs towards methodological issues. In both individual and group visits, about two-thirds of GPs thought that the academic detailer should give guidelines, and about one-third thought that the academic detailer should only present study results. At least 88% of GPs indicated that they wished to see academic detailers either individually or in their local quality group in the future, and most wanted there to be at least one visit per year.

A further Cochrane review has concluded that audit and feedback to health care professionals have the potential to change health care professionals' behaviour, although effects are generally small to moderate (Jamtvedt et al 2003). The effectiveness of audit and feedback is greater where there is low compliance with recommended practice at baseline. Other reviews have concluded that the feedback should offer alternatives to current practices and occur as an adjunct to other strategies to change behaviour, such as educational programmes and academic detailing, and occur soon after the act of prescribing (Mugford et al 1991, Robertson et al 2001).

However, merely posting out aggregated feedback data is unlikely to affect behaviour change. An Australian study of 2440 full-time, recognised GPs practising in non-urban areas found that unsolicited, centralised, government-sponsored, prescriber feedback based on aggregate data did not affect prescribing levels of GPs (O'Connell et al 1999).

3.10 *Influence of continuing medical education*

A qualitative study of New Zealand GPs' continuing medical education (CME) needs concluded that for some GPs, one event was unlikely to change their behaviour; rather change was evolutionary in response to acquiring the new knowledge from a variety of different credible sources (Goodyear-Smith et al 2003). This is in line with previous research findings. Although attending a lecture may improve knowledge, didactic sessions do not appear to be effective in changing physician performance. Passive dissemination of guidelines alone is unlikely to affect behaviour change. Similarly, mailed educational materials alone are generally ineffective (Ibid.).

A systematic review by Davis and colleagues found that effective strategies in changing physician performance and health care outcomes include reminders, patient-mediated interventions, outreach visits, opinion leaders and multifaceted activities (Davis et al 1995). Audits with feedback and educational materials are less effective, and formal CME conferences or activities, without enabling or practice-reinforcing strategies, have relatively little impact. Evidence from a systematic review does suggest that interactive workshops can result in changes in professional practice (Thomson O'Brien et al 2002). While a single component may not be very effective in changing behaviour, a number of interventions in combination may prove very successful. In all, this suggests that multifaceted interventions and reinforcement from different sources combine to reach a 'critical mass', which over time encourages doctors to change the way they practice, often in an incremental manner (Goodyear-Smith et al 2003).

In New Zealand, an educational intervention within clinical practice education groups used peer discussion based on an evidence-based literature search, with individual prescribing and laboratory data related to the topic provided to each GP (Richards et al 2003). The areas used were those where wide variation in prescribing occurred and where there was a significant gap between actual and ideal prescribing. Key messages were identified and used to target knowledge gaps, resulting in positive effects on GP prescribing that tended to decay over time but were significant for 6 to 24 months.

In addition, CME meetings within the New Zealand setting may give GPs access to specialist knowledge, which has a significant influence on GPs' practice (Cullen 1997).

In the Australian study by McGettigan and colleagues, non-sponsored clinical meetings were rated as important information sources for prescribing 'old' drugs by 57% of 108 GPs and for new drugs by 63% (McGettigan et al 2001). However, no GPs in this study reported a non-sponsored clinical meeting as being the last source used in practice to find information about a new drug. In the United Kingdom study by Jones et al, CME meetings often were not a source of information about new drugs for GPs (Jones et al 2001).

3.11 *Influence of critical incidents*

Critical incidents include events such as a phone call from pharmacist or a long-term locum changing a medication. Evidence indicates that a recommendation by a community pharmacist to initiate, discontinue or change a drug therapy is usually accepted and implemented by a GP (Carroll 2003). Most of these suggestions relate to detecting and correcting clearly inappropriate drug therapy. These interventions are likely also to influence subsequent prescribing decisions.

In the United Kingdom study by Armstrong et al, prescribing practice was most immediately challenged by 'clinical disasters' or potentially dangerous interactions prevented by telephone calls from pharmacists. Other effective challenges occurred when two GPs returned from maternity leave to find that their locum had changed the prescriptions of some of their patients or a treatment had an unexpected success (e.g. fluoxetine for depression) (Armstrong et al 1996).

Appendix 2: Participant Information Sheet

Department of General Practice and Primary Health Care
School of Population Health, The University of Auckland Private Bag 92019 Auckland, New Zealand
Associate Professor Bruce Arroll
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PARTICIPANT INFORMATION SHEET

Project title: Information resources general practitioners use and would prefer to use to inform their prescribing decisions.

Researchers' names: Associate Professor Bruce Arroll, Associate Professor Ngaire Kerse, Dr Felicity Goodyear-Smith, Dr Jeff Harrison

Dear General Practitioner

The Department of General Practice and Primary Health Care in conjunction with the Centre for Health Services Research and Policy (CHSRP) is undertaking a research study funded by the Ministry of Health. The study looks at potential sources of information for prescribing in primary care. You have been selected to take part in this research during a random selection of GPs and/or your inclusion in the National Primary Medical Care (NatMedCa) survey-sampling frame conducted by CHSRP. I would like to invite you to take part in this research project. I emphasise this is voluntary and you are under no obligation to participate.

The study involves a 15–20 minute telephone interview about the information sources you use for prescribing, how you value these sources and how you use this information in clinical scenarios. Some socio-demographic data may be collected.

Your interview responses will be collected and stored by myself for 10 years on a secure password-protected computer drive completely anonymously. No identifying information will be made available in any reports. The Ministry of Health will be provided with a copy of any material prepared for publication. The final report will include recommendations for prescribing support and decision-making. A list of essential and potential data sources will be sent to all participating GPs.

I or one of my GP colleagues will contact you in the next week to confirm your willingness to participate. If you agree, a suitable appointment time will be arranged. An experienced research interviewer will conduct a computer assisted telephone interview (CATI) using an electronic structured questionnaire. The interviewer will obtain verbal consent from you at the onset of the interview. One project aim is to establish the relationship between self-reported prescribing and actual prescribing. To do this, GPs who participated in NatMedCa will be asked whether you are willing for your data to be used for this purpose. If you are, a consent form will be posted to you for signing and return.

You are free to withdraw from the study at any time if you so wish, and can request the removal of your interview data up until 30 June 2004.

A fee of $40 for participation will be paid to you for the appointment period and in recognition of your contribution to the research project.

Thank you very much for your time and help in considering this study. If you have any queries or wish to know more about this study, please contact me.

Associate Professor Bruce Arroll, the Department of General Practice and Primary Health Care at the above address; or Tel 09 373 7599 Ext 86978; Email: b.arroll@auckland.ac.nz. My Head of Department is Professor Gregor Coster, Tel 373 7599 ext 86518, Email: g.coster@auckland.ac.nz

For ethical concerns contact: The Chair, The University of Auckland Human Participants Ethics Committee, Office of the Vice Chancellor, Research Office, Level 2, 76 Symonds Street, Auckland. Tel: 373 7599 ext 87830.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 19 MAY 2004 UNTIL 19 MAY 2007 FOR 3 YEARS. REFERENCE NUMBER 2004/167.

Appendix 3: Data Coding Frames

Coding frame for information sources

Source category	Source code
MIMS New Ethicals	1
MIMS CD-ROM	1.1
New Ethicals Compendium	1.2
BNF	2
Texts	3
Paediatric texts	3.1
Medical texts	3.2
Pregnancy texts	3.3
Drug texts	3.4
Journals	3.5
internet	4
Medical sites	4.1
Prescribing sites	4.2
Pregnancy sites	4.3
Computer	5
PMS	5.1
MedTech32	5.2
Houston	5.3
Next Generation	5.4
Hospital formularies	6
Hospital guidelines	6.1
Medsafe	7
Medsafe website	7.1
PHARMAC	8
PHARMAC schedule	8.1
Guidelines/data sheets	9
Calculator	10
bpac^{nz} slide/calculator	10.1
Contact for advice	11
Contact pharmacist	11.1
Contact specialist	11.2
Contact colleague	11.3
Contact drug companies	11.4
Miscellaneous	12
No source required (known)	13
Unsure	14
Not coded	15

Coding frame for clinical case: eight-year-old with swab proven strep throat

Drug class	Drug name	Drug code	Recommended practice?
Penicillins	Benzylpenicillin Sodium (Penicillin G)	1	Yes
	Phenoxymethylpenicillin (Penicillin V)	1	Yes
	Procaine Penicillin	1	Yes
	Cilicaine	1	Yes
	Compocillin V	1	Yes
	Penicillins	1	Yes
Penicillins broad spectrum	Amoxycillin	1.1	Yes
	Benzathine Penicillin	1.1	Yes
Penicillins penicillinase	Flucloxacillin Sodium	1.2	Yes
	Dicloxacillin	1.2	Yes
Macrolides	Erythromycin Lactobionate	2	No
	Clarithromycin	2	No
	Roxithromycin	2	No
	Azithromycin	2	No

Coding frame: 75-year-old with mild hypertension

Drug class	Drug name	Drug code	Recommended practice?
Alpha adrenoceptor blocker	Prazosin	3	No
	Doxazosin	3	No
Angiotension converting enzyme (ACE) inhibitors	Cilazapril	4	No
	Quinapril	4	No
	Benazepril	4	No
	Lisinopril	4	No
	Perindopril	4	No
	Trandolapril	4	No
	Enalapril	4	No
	Captopril	4	No
Beta blocker	Propranolol	5	Yes
	Celiprolol	5	Yes
	Labetalol	5	Yes
	Metoprolol	5	Yes
	Timolol	5	Yes
Thiazides and related diuretic	Bendrofluazide	6	Yes
	Cyclopenthiazide	6	Yes
	Indapamide	6	Yes
	Chlorothiazide	6	Yes
Loop diuretics	Frusemide	6.1	No
	Bumetanide	6.1	No
Potassium sparing diuretics	Spironolactone	6.2	No
Calcium antagonists	Diltiazem	7	No
	Felodipine	7	No
	Nifedipine	7	No
	Verapamil	7	No
Central acting antihypertensive	Clonidine	8	No
Angiotension II antagonists	Losartan	9	No

Coding frame: eight-year-old swab proven strep throat

Drug class	Drug name	Drug code	Recommended practice?
Penicillins	Benzylpenicillin Sodium (Penicillin G)	1	Yes
	Phenoxymethylpenicillin (Penicillin V)	1	Yes
	Procaine Penicillin	1	Yes
	Cilicaine	1	Yes
	Compocillin V	1	Yes
	Penicillins	1	Yes
Penicillins broad spectrum	Amoxycillin	1.1	Yes
	Benzathine Penicillin	1.1	Yes
Penicillins penicillinase	Flucloxacillin Sodium	1.2	Yes
	Dicloxacillin	1.2	Yes
Macrolides	Erythromycin Lactobionate	2	No
	Clarithromycin	2	No
	Roxithromycin	2	No
	Azithromycin	2	No

Coding frame: Malaria information sources

Source	Code-malaria sources
BNF	1
CDC/WHO	2
Contact colleague	3.1
Contact Ministry of Health	3.2
Contact pharmaceutical reps	3.3
Contact pharmacy	3.4
Contact specialists	3.5
Medlab	3.5
Contact travel services	3.6
Known	4
Medsafe	6
Ministry of Health	7
Ministry of Health travellers' guide	7.1
New Ethicals	8.1
New Ethicals Compendium	8.2
Text medical	9.1
Text on travel	9.2
Text paediatric medical	9.3
Text drugs and pregnancy	9.4
Travellers' guide	10
Website search	11
Website travel medicine	11.1
Websites travel	11.2
PMS	12
Known	13

Coding frame: malaria information sources reliability

Source	Source reliability		
	Malaria tablets for children	**Malaria tablets for pregnant women**	**Resistant malaria countries**
BNF	Good	Good	Good
CDC/WHO	Good	Good	Good
Contact colleague	Maybe	Maybe	Maybe
Contact Ministry of Health	Good	Good	Good
Contact pharmaceutical reps	Poor	Poor	Poor
Contact pharmacy	Good	Good	Good
Contact specialists	Good	Good	Good
Medlab	Good	Good	Good
Contact travel services	Good	Good	Good
Known			
Medsafe	Good	Good	Poor
Ministry of Health	Good	Good	Good
Ministry travellers' guide	Good	Good	Good
New Ethicals	Good	Good	Poor
New Ethicals Compendium	Good	Good	Poor
Text medical	Maybe	Maybe	Maybe
Text on travel	Good	Good	Maybe
Text paediatric medical	Good	Good	Maybe
Text drugs and pregnancy	Poor	Good	Poor
Travellers' guide	Good	Good	Good
Website search	Good	Good	Good
Website travel medicine	Good	Good	Good
Websites travel	Good	Good	Good
PMS	Maybe	Maybe	Maybe

Coding frame: journal codes

Category	Journal code
AFP	1
BJGP	2
BMJ	3
CMJ	4
GP magazines	5
Lancet	6
Miscellaneous	7
New Ethicals	8
NZFP	9
NZMA	10
NZMJ	11
Other	12
RNZCGP journal	13
SAMJ	14
Various	15

Glossary and List of Acronyms

A&M:	Accident and Medical
AFP:	*American Family Physician*
BMJ:	*British Medical Journal*
BJGP:	*British Journal of General Practice*
BNF:	*British National Formulary*
bpac^{nz}:	Best Practice Advocacy Centre of New Zealand
CATI:	computer assisted telephone interviewing
CDC:	Centers for Disease Control and Prevention
CME:	continuing medical education
CMJ:	*Canadian Medical Journal*
Dermnet:	New Zealand website for dermatological information
D&TB:	*Drugs and Therapy Bulletin*
DTCA:	direct-to-consumer advertising
E-medicine:	electronic medicine
FRNZCGP:	Fellow of The Royal New Zealand College of General Practitioners
GP:	general practitioner
GP DAT:	type of practice management system
Houston:	type of practice management system
IPA:	Independent Practitioners' Association
MedCen:	type of practice management system
Medline:	Produced by the US National Library of Medicine, the Medline database is widely recognised as the premier source for bibliographic coverage of biomedical literature.
Medsafe:	New Zealand Medicines and Medical Devices Safety Authority
MedTech 32:	type of practice management system
MIMS:	*Monthly Index of Medical Specialties* – a publication including most available primary medical care prescription drugs and treatments.
Ministry:	Ministry of Health
My Practice:	type of practice management system
NE:	*New Ethicals*
New Ethicals:	a publication including most available primary medical care prescription drugs and treatments (now published as *MIMS New Ethicals*)
Next Generation:	type of practice management system
NZFP:	*New Zealand Family Physician*
NZHIS:	New Zealand Health Information Services
NZMJ:	*New Zealand Medical Journal*
PDA:	personal digital assistant (hand-held computer)
PHARMAC:	Pharmaceutical Management Agency
PHO:	Primary Health Organisation
PIS:	Participant Information Sheet
PMS:	practice management system
PreMeC:	Preferred Medicines Centre
Profile:	type of practice management system
RNZCGP:	The Royal New Zealand College of General Practitioners
SAMJ:	*South African Medical Journal*

SAS:	Statistical Analysis Software – a software package for statistical analysis
SES:	socioeconomic status
WHO:	World Health Organization