

Prescribing information resources: Use and preference by New Zealand general practitioners

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ABSTRACT

Aims

To identify sources New Zealand (NZ) general practitioners (GPs) use to inform themselves about prescribing issues; how they keep their information up-to-date, and factors influencing prescribing decisions.

Methods

Computer-assisted telephone interviews of 99 randomly-selected NZ GPs in 2004.

Results

Seventy-two per cent response rate. *MIMS/New Ethicals* was the most commonly used resource but is reported to be limited in the information it provides. There was no single source of prescribing information identified by this group of NZ GPs. Despite frequent use of computers in general practice, use of prescribing websites was low. Barriers to Internet use for prescribing were lack of: time; awareness; fast access; and computer literacy. Rapidly-accessed resources are reported to be more likely to be used in clinical decision-making than higher quality but slower access ones. Costs to patients and direct-to-consumer advertising were identified as influences on prescribing.

Implications

Useful Internet sites allow for easy electronic searching and easily digestible summarised information in a user-friendly format. A one-stop Internet resource with fast access which is up-to-date, comprehensive and NZ-orientated with respect to drug availability and funding would maintain quality reliable information. NZ GPs are not currently maximising the potential of Internet-based medication prescribing decision support.

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Introduction

Modern medicine is a rapidly changing and evolving body of complex knowledge. Nowhere is the assimilation of new knowledge more challenging than in the field of pharmacotherapy. Drugs are increasingly 'high-tech' in their actions and uses and older, more established drugs are

used in new ways as our experience with them grows. Doctors are charged with the prescription of these agents hence it is reasonable to expect them to keep up to date with the knowledge required to discharge this responsibility appropriately, but how? A comprehensive review of the literature describing the sources of in-

formation GPs use to update their knowledge and factors which influence their adoption of a new drug indicates that GPs face considerable challenges in this area.^{1,2}

Information sources for GPs vary in both content and the mode of information delivery. Connelly et al. identified five criteria that they believe GPs use to assess information sources: credibility, availability, searchability, understandability and applicability.¹ GPs are most likely to use drug reference books for prescribing information¹ even though they are rated as less valuable than colleagues and specialists as information sources.³ Non-peer reviewed publications may be more likely to influence GP prescribing than scientific peer-review journals.⁴ The Internet offers huge potential for doctors to access information. However in 2001 just 37% of NZ GPs were found to use the Internet for drug information,⁵ and by 2003 only 33% of rural GPs used the Internet for help with patient care despite 90% of them having access to the Internet at home.⁶

There are numerous influences on GPs prescribing. The pharmaceutical industry, by extensive advertising and academic detailing influences prescribing behaviour more than GPs themselves realise.^{7,8,4} Dissemination of independent scientific data about a new drug or guidelines relating to drug use seldom enjoys an equivalent degree of financial backing and is not found to be related to prescribing. Direct-to-consumer advertising (DTCA) of prescription medicines generates consultations⁹ and, as NZ is one of only two industrialised countries which permits DTCA, this is likely to have a currently unquantifiable influence on prescribing. The patient, their condition and their situation also influence the GP's decisions about prescribing. Patient preferences, while perceived to have only a small influence on prescribing decisions, may be a powerful driver.⁸ GPs' perception of patient

pressure is also strongly associated with prescribing.¹⁰

Early experience of using a drug influences future use, so that feedback from the first few patients impacts future use of a new drug.¹¹ GPs both in NZ and overseas are influenced by hospital prescribing, with respected colleagues being as influential as prescribing leaders.^{3,4,11} Collegial advice is rated as more important than written pharmaceutical references⁸ and the medium, that is, via people, may be more important than the message.⁷

Several strategies are effective in influencing prescribing, such as academic detailing,¹² audit and feedback reminders,¹³ patient-mediated interventions, outreach visits, opinion leaders, and multi-faceted activities.¹⁴ However these strategies are not routinely used in NZ or less effective programmes are used, such as a single continuing medical education (CME) session¹⁵ or merely posting out aggregated feedback data which is unlikely to effect behaviour change.¹⁶

Little is known about how GPs inform themselves about prescribing issues in New Zealand. Structural changes, such as fund-holding, provision of subsidised medicines^{17,18, 19} and critical incidents, such as a phone call from pharmacist or a long-term locum changing a medication, result in changes in prescribing.²⁰ However policy change, funding and long-term planning are needed for structural changes.

The aims of this study were to identify sources that NZ GPs use to inform themselves on prescribing decisions; describe how GPs find information about new drugs and keep their information up-to-date, and determine what other factors GPs perceive to influence their prescribing decisions.

Methods

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 was international, but New Zealand studies were referred to where available. The study questionnaire was developed based on the literature; consultation with key stakeholder representatives and com-

mentary from the Ministry of Health. It included self-reported use of information sources and two clinical scenarios to establish self reporting of usual prescribing. The scenarios: (1) A 75-year-old with high new blood

pressures 180/85 with normal renal function and no contraindication to drugs; and (2) an eight-year-old with clinical and swab-proven Streptococcal throat infection. These were designed to determine which GPs were 'recommended practice' prescribers. Finally, respondents were asked to identify where they would look for specific information, for example, on recommended malaria prophylaxis.

A random nationally representative sample of 300 GP contacts was purchased from MediMedia Group to ensure a sample representative of New Zealand GPs. Inclusion criteria were full-time or part-time GPs and GP locum tenens. Doctors working exclusively at Accident and Medical Clinics and sub-specialty practitioners (for example, sports medicine) were excluded. The required sample size was 100 respondents for an estimate of prescribing behaviour with 10% accuracy. The survey was pilot tested with a 1% sub-sample of GPs (n=11) and amended to improve usability.

The pharmaceutical industry, by extensive advertising and academic detailing influences prescribing behaviour more than GPs themselves realise

Table 1. Use and preferences of standard prescribing information reported by GPs

Source	% used by the 99 GPs	% using resource who rated it useful/very useful	Comments
Mims/New Ethicals	87	85 (n=76)	Most frequently used resource
Pharmaceutical company material (mailed)	85	55 (n=84)	Widely used but not rated very useful
PHARMAC schedule and/or updates	78	48 (n=77)	35% saw no utility or need; 20% not user-friendly, 20% overwhelming in size and/or frequency
IPAs & PHOs CME guidelines	67	75 (n=68)	Used by two thirds of GPs
Medical journals	65	79 (n=64)	Wide range of publication types judged as useful
BNF	58	82 (n=57)	Rated highly by those who used it
Medsafe	53	70 (n=54)	Mostly used for datasheets
Websites	40	30 (n=40)	Only 12 GPs used websites for prescribing weekly or more (5 used daily)
New Ethicals Compendium	36	97 (n=31)	While only a minority used these, those who did valued them highly
MIMs CD ROM	28	96 (n=27)	

Recruitment involved faxing the randomly-selected GPs, with a follow-up telephone call from a GP colleague for non-responders. The survey was administered using computer-assisted telephone interview (CATI) techniques and Survey Systems version 8.1 software. CATI interviewers obtained verbal consent from GP respondents at the start of the interview, confirming the agreement made at the time of recruitment.

Analysis used the SAS software package. This included descriptive tabulations of all variables captured within the survey, cross-tabulations of related variables of interest, and sub-group 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.

A 50% random sample of observations was selected for quality control audits of responses to the clinical scenarios. Quality auditors en-

sured a high level of data quality and integrity. For a sample size of 100, the margin of error was calculated to be less than 10%.

Ethical approval was received from the University of Auckland Human Subjects Ethics Committee.

Results

Of 199 GPs approached, 39 declined to participate, 60 were ineligible (because they worked exclusively at accident and medical clinics or as sub-specialty practitioners such as sports medicine doctors), and one was lost to follow-up, giving a response rate of 71.7% (99 GPs). The gender (70% male) and age distribution and mean age of GPs was consistent with the proportions within the wider GP population. The majority (95%) of GPs had completed a postgraduate training programme, mostly with the Royal New Zealand College of General Practitioners (RNZCGP). The median number of sessions worked was nine per week. The majority of participants (73%)

worked in urban practices and were part of a Primary Healthcare Organisation (PHO) or Independent Practitioner's Association (IPA) (93%). Most (95%) had access to computerised prescribing systems although only about one-third used fully computerised practice management systems (PMS).

Comparison with the nationally representative National Primary Medical Care Study (NatMedCa 2001–02) showed similar proportions with respect to GPs' age, qualifications, and practice characteristics of size and computerisation.

Use and value of prescribing resources

Choice of commonly used prescribing information sources are shown in Table 1. The majority used different resources depending on particular information needs, especially for information about prescribing in pregnancy and breastfeeding or where funding-related information was needed. Only one GP used a per-

sonal digital assistant (PDA) to access prescribing information.

Internet resources

Only 40% of the GPs used Internet resources to access information about prescribing. The main reasons identified as barriers to Internet use were lack of time; awareness or access (or slow Internet connection), and computer literacy. A small number commented on the use of the Internet and the impact on patient interaction, referring in particular to computer use being a distraction to the consultation. Whilst most GPs (93%) had access to the Internet at home, only 64% had access in their consultation rooms. While two-thirds of GPs had Internet access available during the consultation, only 63% of these GPs reported using the Internet for clinically-related activities. Twenty-seven per cent had broadband access, with a trend towards increased use of prescribing websites by these GPs.

Although there is a high uptake of computerisation by GP practices in NZ only 53% of practices have become 'paperless'. Among the remaining practices there was almost complete adoption of age/sex registers (99%) and very high uptake of computerised records (89%), lab reporting (91%) and prescribing (95%).

Specialists as resources

GPs were mostly of similar views when indicating reasons for usefulness of hospital registrars or consultants. They included predominantly reference to being specialists in the

topic/area, and/or having specific subject knowledge, whether patient- or drug-specific. Generally, GPs appeared to have good response from public hospital specialists and found their skills and advice to be required and valuable. Specialist knowledge and the ability to answer GPs' questions were common reasons for usefulness. Private consultants were often identified as easier to access than their public hospital colleagues. Thirty per cent of the GPs reported they did not see pharmaceutical representatives.

Information sources to which GPs would like access

GPs indicated they would like more readily available information sources and support for prescribing, through electronic (computer databases and/or Internet) or text-based information and support people or agencies. Many GPs suggested integration of computer sources with their PMS. Electronic resources were seen to provide benefits through the collation of diverse information resources and the ease of maintaining up-to-date sources.

GPs also indicated they would like greater access to experts, particularly hospital pharmacists through email and/or telephone support. Perceived benefits were the enabling of one-to-one contact and readily accessible information which was considered up-to-date and reliable. Experts were seen as being able to answer specific questions without the need for the GP to search other information sources.

Influences on prescribing

Reported influences on prescribing are shown in Table 2.

The most commonly perceived influence was the cost of medication to the patient.

When asked what other factors influenced their prescribing, GPs reported '*patients' willingness to be prescribed drugs*'. Many GPs were against Direct To Consumer Advertising (DTCA) because '*it leads to false patient expectations and demanding on the GP in terms of time required to explain why a drug is not suitable for the patient*'. However GPs also responded that they felt DTCA was beneficial to patients because '*it assists drug compliance*' (for example, for asthma) or '*the patient becomes more involved in their care*'. A number of GPs felt the frequent changes and updating of the pharmaceutical schedule made it difficult to know what was subsidised, unsubsidised or removed.

Response to clinical scenarios

About 16% of GPs did not choose the recommended first-line medication for treatment of newly diagnosed hypertension (thiazide diuretic or beta blocker) as recommended in the NZ guidelines.²¹ When choice and dose of anti-hypertensive, and choice and duration of antibiotic were combined, just over half the GPs participating gave responses deemed to be best 'recommended practice'.

Nearly half of the GPs (46%) relied on text sources to determine which countries had chloroquine-resistant malaria. Using text sources for information on malaria tablets for children (30%) and pregnant women (48%) was less concerning, given that this information is less subject to frequent change.

Full-time GPs were more likely to be 'recommended practice' prescribers than part-time GPs (55% versus 45%) suggesting that greater clinical experience may be influential, although this difference is not

Table 2. Influences on prescribing as reported by NZ GPs

Influence	% some or strong influence (n=99)
Cost of drug to patient	90
DTCA on patient expectations	77
Informed patient (from Internet or text)	54
Perceived patient expectations	39
DTCA on GP prescribing	15

statistically significant (Pearson $\chi^2 = 2$; $df = 1$; $p = 0.16$).

'Recommended practice' prescribers used prescribing websites more frequently than others ('at least weekly' 18.7% versus 5.9%) (Fisher's exact $p = 0.04$) which suggests that these websites may provide influential information. Interestingly, having broadband access in the consulting room was not a determinant of being a 'recommended practice' prescriber compared to 'other practice' prescribers (22% versus 40%).

Discussion

Recommendations based on the literature

From our assessment of the literature, strategies to improve evidence-based prescribing should involve provision of a number of interventions in combination, with multi-faceted interventions and reinforcement from different sources which may combine to reach a 'critical mass' encouraging GPs to change.¹⁵ Repeating/reinforcing messages at 12- to 24-month intervals helps sustain changes in prescribing practice after an education intervention which tend to decay over time.²² Encouraging GPs to formally identify their personal formularies and to review and rationalise these, basing evaluation on the principles of comparative efficacy, safety, suitability and cost of the treatment alternatives, may be best done within the context of managing particular clinical conditions, in conjunction with clinical guidelines.²³

As new drug prescribing by GPs often follows that initiated by hospital colleagues, there should be an integrated approach to new drug introduction across primary and secondary care.⁴ Medical specialists need to have up-to-date and reliable knowledge and be aware of their influence and role in passing this on to GPs.³

To ensure that information provided in advertisement form is evidence-based,⁸ limiting or controlling

the educational activities of the pharmaceutical industry may be required.²⁴ GPs should be encouraged to directly ask patients about their expectations, in order to avoid being pressured by incorrectly perceived patient preferences.¹⁰ Drug prescription information should be distributed via independent agencies using educational strategies that require personal contact and generate positive attitudes among GPs towards these sources.²⁴ Appropriately trained pharmacists can be used to provide pharmaceutical care and encourage recommendations to GPs.²⁰ Academic detailing²⁵ and using a proactive approach to dissemination of independent scientific data, rather than relying on information spread by diffusion,²⁶ can assist in evidence-based prescribing.

GPs may require training in basic information literacy skills; identifying evidence-based sources and critical appraisal skills.⁵ Provision of Internet portals can guide GPs to selected resources and a document delivery service which allow GPs to access useful citations from MEDLINE without delay or cost.⁵ Desirable features of an effective prescribing tool include alphabetical and class-based organisation, search functions, point of care accessibility, regular updating, interaction checking, specific contra-indications, lactation and obstetric hazards, adult and paediatric dosing and appropriate travel information.

Implications drawn from our study

GPs in New Zealand report using mainly standard written sources for drug information to inform themselves on prescribing decisions. The *New Ethicals/MIMs* catalogue was cited as a frequent and useful information source for GPs.

A prescribing decision is one that GPs make based on their assessment

of what is therapeutically most appropriate for their patients and may include a wide range of inputs.

Sources that are rapidly available are more likely to be used than those which may be of higher quality but are too slow to access for the time-strapped GP needing to make a clinical decision. Not all GPs had access to even slow-speed Internet during the consultation. It is thus not surprising that the *New Ethicals/MIMs*, which is usually to hand on the consulting desk, is the most favoured resource on a day-to-day basis. It is used predominantly for establishing correct dosage and less frequently for information about

drug interactions, adverse reactions and hepatic or renal impairment. However there is no specific section for breastfeeding and pregnancy.

The *New Ethical Compendium* was previously (until 1997) a free and relatively up-to-date source of NZ-orientated information on adverse reactions, drug interactions and drug use in patients with hepatic or renal impairment. Two-thirds of the GPs in our study were not using it at all, and those who did used it infrequently, although it was judged to be a very helpful resource by those who did. This probably reflects the fact that this resource is now an expensive purchase, is a cumbersome single large hard-backed book rather than two small lighter volumes, and requires considerable financial commitment to regularly update. It is unknown whether those few GPs using it are relying on their older free versions or have purchased the most recent publication.

Influences on prescribing were reported to include patient expectations and cost to patients. DTCA was not often felt to have a significant impact on prescribing by most GPs but was acknowledged as a factor that influenced patients' expectations of prescribing.

Even though there is a very high use of computers in general practice, the use of prescribing websites was low

Even though there is a very high use of computers in general practice, 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 Medsafe was the most commonly used when they did access a prescribing website and we speculate that it is mainly accessed for complex or specific information. Practitioners using it found it very useful. It should be noted however that while the datasheets on the Medsafe website are comprehensive, the site has datasheets for many but not all of prescribed medications.

More GPs have access to the Internet at home than in the consulting room. While GPs may be using PMS 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-based resources is that they can be kept updated whereas paper-based texts need replacing with newer versions. The interactivity available in some web-based resources allows a degree of flexibility unobtainable using 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 and to be able to critically appraise their information sources. It may be slower to access information from the web than from a well-known text. However, information may be more rapidly available with seamless access through the PMS if the GP has developed the necessary computer-literacy; and if fast Internet access is available.

In fact in the time since this study was conducted, most PMS have developed a prescribing facility with access to data sheets and direct

Internet links to information through MIMS and Medsafe.

The low value that GPs put on the PHARMAC Schedule may be due to its primary role being a guide to pharmaceutical funding. However in many instances funding is one of the most significant factors that impact on the prescribing decision. The fact that the cost of drug to the patient was considered to be a major influence suggests that this may be a dominating factor in NZ prescribing. Others have found that socio-economic status is important to prescribing.²⁷ This highlighted the need to decrease the barrier of cost of drugs to patients, an action which has since occurred for some age groups.

In terms of influence on prescribing, most GPs thought that DTCA had an influence on prescribing mostly through influence on the patient. Given the rise in prescribing of DTCA items (for example sildenafil citrate), we feel this influence may be more marked than the GP realises. A recent randomised controlled trial found that patients' requests as a result of DTCA had a profound effect on physician prescribing in major depression.²⁸

GPs recognise pharmaceutical information as frequently available although not particularly useful. However the pharmaceutical industry has an impact on prescribing patterns.⁴ GPs' views are concordant with the knowledge that information presented by the industry (through advertising material and via representative presentations) may not be based on scientific evidence.²⁹ Despite GPs' views, other authors have shown physicians' understanding of medication to be related to industry information,⁸ meaning that potentially GPs' views of usefulness may be discordant with the impact of pharmaceutical detailing on their prescribing. Further research is needed to better understand this relationship. On the other hand, about one-third of GPs do not have pharmaceutical representatives visit, and

the markedly diminished role of drug companies in providing GP CME would suggest that industry information may be less influential on prescribing behaviour than it was in the past.

There were surprisingly few distinguishing characteristics between those who followed 'recommended practice' (defined by their reported practice of prescribing for the scenarios) and those who did not. Perhaps this is because GPs vary in the way they use information to solve problems. One study has indicated two common types of GPs: those who use two specific sources or had a method they applied to all situations, and those described as problem-dependent, that is, they used three or more sources, and they varied their sources depending on the presenting problem.³⁰

Access to broadband Internet may be an influence on prescribing decisions, with a greater percentage of 'recommended practice' GPs having broadband access. The inaccessibility of computer sources, particularly Internet and Internet speed, was an apparent barrier for many and the notion of free/funded web access and broadband (fast Internet access) was discussed by several GPs.

A strength of this research was the use of a multi-disciplinary team, including GPs and a pharmacist, who developed the study instrument. It was informed by a comprehensive literature search and underwent extensive piloting before the final version of the questionnaire was produced. The sampling frame included the majority of NZ GPs. Random sampling and the high response rate of 74% allows for generalisability of the findings across the NZ GP population. The use of the computer-assisted telephone-interviewing (CATI) service allowed for consistent data collection using highly trained interviewers. The use of clinical scenarios allowed 'recommended' and 'other practice' prescribers to be identified and correlations sought between

practitioner knowledge of good practice prescribing and their knowledge and use of prescribing resources.

A limitation of the study was the sample size which precluded in-depth sub-group analyses. These findings are self-reported responses of the interviewed GPs and may differ from the actual behaviour of the doctors in some aspects or under certain conditions.

The potential for bias exists for *MIMS/New Ethicals* use to 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 changes in question order to address this. In a future survey resources could be presented in a different order. MediMedia, the company owning the database of GPs used to select participants also owns *MIMS/New Ethicals*, which makes it likely that all sampled GPs do receive free copies of *MIMS/New Ethicals*.

There is no single source of prescribing information available to NZ GPs. There are several approaches to a combined integrated prescribing resource that could be achieved 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.

Recommendations by the authors

In our opinion, a 'one-stop shop' concept, combining information from BPAC, Medsafe and PHARMAC origins into one respected publication available through a single conduit would make prescribing information more accessible. Inter-sectoral strategies would aid prescribing support,

with targeting of information access as well as educational strategies. Consideration is required to providing broadband Internet access to all GPs, especially rural GPs, and then directing them to appropriate websites to increase access to quality information. This may necessitate some training in Internet use, possibly a helpline for instant support. Web-based resources should be designed with possible access through PDA technology in mind.

MIMS/New Ethicals is the most commonly used source of 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, renal and liver dysfunction. A resource with pregnancy, breastfeeding, renal/liver failure, interactions and adverse effects was indicated as being desirable by GPs in our study and there are few resources that presently include these. This means that GPs require and refer to multiple information sources (mainly

texts). For efficiency a searchable electronic resource (CD which can be updated or web-based) 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. Since our study in fact *MIMS* has become incorporated into some of the PMS. Training might be required to ensure that GPs have the skill to effectively and efficiently use this resource.

Over-reliance on texts is concerning because it is not clear whether their information is up-to-date, and such resources need to be renewed frequently. We see the continuing move towards use of electronic resources as desirable.

GPs following recommended practice were more likely to have broadband Internet access available. There may be some merit in making this mandatory and providing some resources to ensure it happens. Speed of access is a critical factor in GP choice of resources and a slow Internet access may preclude use of this medium. Furthermore, as many GPs indicated that Internet access and use of electronic information sources were preferable, a web portal (specific website acting as a gateway) containing relevant and reliable links with regular updates could be an effective and efficient reference for prescribing decisions.

A number of GPs were not aware that the *BNF* is available at www.bnf.org. Making this knowledge available, as well as information about other reliable and valuable sources that are not widely known about, would be helpful to GPs. This could include advice of best practice sources and could be published and circulated annually, therefore enabling updated listing of best practice sources. Other initiatives identified in our study included addressing the issue of DTCA and its potential influence on prescribing, as well as the impact on patient-practitioner relationships and consultation time/practitioners' workload; deduction in cost of drugs to patients, which is now occurring, and strategies to improve prescribing are best to target not only GPs but also pharmacists and patients.

In summary, in the authors' view, GPs would highly value a one-stop resource with fast access which is up-to-date, comprehensive and NZ-orientated with respect to drug availability and funding. Useful Internet sites allow for easy electronic searching and easily digestible summarised information in a user-friendly format. This would be one way of maintaining quality with respect to information being reliable and keeping up to date. Consideration could be given to providing broadband Internet access to all GPs, with a developed web portal or site accessed

Over-reliance on texts is concerning because it is not clear whether their information is up-to-date, and such resources need to be renewed frequently

through their PMS, directing them to appropriate links and efficiently accessible reliable prescribing resources.

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Disclaimer

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Competing interests

Bruce Arroll is a member of the future forum primary care committee, which is an educational foundation funded by AstraZeneca UK and a member of the Pharmac Seminar Advisory Committee. Jeff Harrison has, within the last five years, acted as a consultant to CMPMedica, owners of the *MIMS/New Ethicals* publications. All other authors declare no competing interests.

References

- Connelly DP, Rich EC, Curley SP, Kelly JT. Knowledge resource preferences of family physicians. *Journal of Family Practice* 1990; 30(3):353-359.
- Verhoeven AAH, Boerma EJ, Meyboom-De Jong B. Use of information sources by family physicians: A literature survey. *Bulletin of the Medical Library Association* 1995; 83(1):85-90.
- Cullen R. The medical specialist: Information gateway or gatekeeper for the family practitioner. *Bulletin of the Medical Library Association* 1997; 85(4):348-355.
- Prosser H, Almond S, Walley T. Influences on GPs' decision to prescribe new drugs – the importance of who says what. *Family Practice* 2003; 20(1):61-68.
- Cullen RJ. In search of evidence: Family practitioners' use of the Internet for clinical information. *Journal of the Medical Library Association* 2002; 90(4):370-379.
- Janes R, Arroll B, Buetow S, Coster G, McCormick R, Hague I. A minority of rural North Island general practitioners appear to use Internet websites as a source of health information. *New Zealand Family Physician* 2004; 31(4):239-244.
- McGettigan P, Golden J, Fryer J, Chan R, Feely J. Prescribers prefer people: The sources of information used by doctors for prescribing suggest that the medium is more important than the message. *British Journal of Clinical Pharmacology* 2001; 51(2):184-189.
- Avorn J, Chen M, Hartley R. Scientific versus commercial sources of influence on the prescribing behavior of physicians. *American Journal of Medicine* 1982; 73(1):4-8.
- Toop L, Richards D, Dowell T, Tilyard M, Fraser T, Arroll B. Direct to consumer advertising of prescription drugs in New Zealand: For health or for profit? 2003.
- Little P, Dorward M, Warner G, Stephens K, Senior J, Moore M. Importance of patient pressure and perceived pressure and perceived medical need for investigations, referral, and prescribing in primary care: nested observational study. *British Medical Journal* 2004; 328(Feb):444.
- Jones MI, Greenfield SM, Bradley CP. Prescribing new drugs: qualitative study of influences on consultants and general practitioners. *British Medical Journal* 2001; 323 (Aug 18):378-381.
- Thomson O'Brien MA, Freemantle N, Oxman AD, Wolf F, Davis DA, Herrin J. Continuing education meetings and workshops: effects on professional practice and health care outcomes (Cochrane review). 2002.
- Jamtvedt G, Young JM, Kristoffersen DT, Thomson O'Brien MA, Oxman AD. Audit and feedback: effects on professional practice and health care outcomes. [update of Cochrane Database Syst Rev. 2000;(2):CD000259; PMID: 10796520]. *Cochrane Database of Systematic Reviews* 2003(3):CD000259.
- Davis DA, Thomson MA, Oxman AD, Haynes RB. Changing physician performance: A systematic review of the effect of continuing medical education strategies. *Journal of the American Medical Association* 1995; 274(9):700-705.
- Goodyear-Smith F, Whitehorn M, McCormick R. General practitioners' perceptions of continuing medical education's role in changing behaviour. *Education for Health* 2003; 16(3):328-338.
- O'Connell DL, Henry D, Tomlins R. Randomised controlled trial of effect of feedback on general practitioners' prescribing in Australia. *BMJ* 1999; 318(7182):507-11.
- Wilson RPH, Buchan I, Walley T. Alterations in prescribing by general practitioner fundholders: An observational study. *British Medical Journal* 1995; 311(7016):1347-1350.
- Metcalfe S, Dougherty S, Brougham M, Moodie P. PHARMAC measures savings elsewhere to the health sector. *New Zealand Medical Journal* 2003; 116(1170):U362.
- Moodie P, Metcalfe S, McNee W. Response from PHARMAC: difficult choices.[comment]. *New Zealand Medical Journal* 2003; 116(1170):U361.
- Carroll NV. Do community pharmacists influence prescribing? *Journal of the American Pharmaceutical Association* 2003; 43(5):612-621.
- New Zealand Guidelines Group. New Zealand cardiovascular guidelines. Wellington; 2005 June.
- Richards D, Toop L, Graham P. Do clinical practice education groups result in sustained change in GP prescribing? *Family Practice* 2003; 20(2):199-206.
- Robertson J, Fryer JL, O'Connell DL, Smith AJ, Henry DA. Personal formularies. An index of prescribing quality? *European Journal of Clinical Pharmacology* 2001; 57(4):333-41.
- Figueiras A, Caamano F, Gestal-Otero JJ. Influence of physician's education, drug information and medical-care settings on the quality of drugs prescribed. *European Journal of Clinical Pharmacology*. 2000; 56(9-10):747-53.
- Habraken H, Janssens I, Soenen K, van Driel M, Lannoy J, Bogaert M. Pilot study on the feasibility and acceptability of academic detailing in general practice. *European Journal of Clinical Pharmacology* 2003; 59(3):253-60.
- Arroll B, Goodyear-Smith F, Thomas D, Kerse N. Delayed prescriptions: evolution of an innovation. *New Zealand Family Physician* 2003; 30(1):30-34.
- Scott A, King M. Is general practitioner decision making associated with patient socio-economic status? *Social Science & Medicine* 1996;42:1.
- Kravitz R, Epstein R, Feldman M, Franz C, Azari R, Wilkes M, et al. Influence of Patients' Requests for Direct-to-Consumer Advertised Antidepressants: A Randomized Controlled Trial. *Journal of American Medical Association* 2005;293:1995-2002.
- Tuffs A. Only 6% of drug advertising material is supported by evidence. *British Medical Journal* 2004; 38(28 feb):485.
- Gerrett D, Clark JC. General medical practitioners' approaches to accessing animate sources of drug information. *Drug Information Journal* 1997; 31(1):221-227.