

Refereed paper

A bibliometric analysis of Australian general practice publications from 1980 to 2007 using PubMed

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ABSTRACT

Background We analysed Australian general practice (GP) publications in PubMed from 1980 to 2007 to determine journals, authors, publication types, national health priority areas (NHPA) and compared the results with those from three specialities (public health, cardiology and medical informatics) and two countries (the UK and New Zealand).

Method Australian GP publications were downloaded in MEDLINE format using PubMed queries and were written to a Microsoft Access database using a software application. Search Query Language and online PubMed queries were used for further analysis.

Results There were 4777 publications from 1980 to 2007. *Australian Family Physician* (38.1%) and the *Medical Journal of Australia* (17.6%) contributed 55.7% of publications. Reviews (12.7%), letters (6.6%), clinical trials (6.5%) and systematic reviews (5%) were the main PubMed publication types. Thirty five percent of publications addressed National

Health Priority Areas with material on mental health (13.7%), neoplasms (6.5%) and cardiovascular conditions (5.9%). The comparable numbers of publications for the three specialities were: public health – 80 911, cardiology – 15 130 and medical informatics – 3338; total country GP comparisons were: UK – 14 658 and New Zealand – 1111.

Discussion Australian GP publications have shown an impressive growth from 1980 to 2007 with a 15-fold increase. This increase may be due in part to the actions of the Australian government over the past decade to financially support research in primary care, as well as the maturing of academic general practice. This analysis can assist governments, researchers, policy makers and others to target resources so that further developments can be encouraged, supported and monitored.

Keywords: Australia, bibliometrics, general practice, medical informatics, PubMed

Background

Currently, Australia ranks third in the number of publications included in PubMed under the indexed term 'Family Medicine/General Practice'. It comprises 6.5% of this group of publications, following the UK with 37.3% and the USA with 27%.¹ Publication output from Australian general practice has been steadily increasing with a five-fold rise in the number of publications from 1990 to 1999.² Given that these publications are in peer-reviewed journals, it is likely that research papers have contributed to some of this increase. This is in spite of the known 'disparity between the level of research output of general practice and that of other disciplines such as medicine, surgery and public health'.³

The World Organization of Family Doctors (WONCA) has been concerned about this apparent lack of research in general practice.⁴ The *Medical Journal of Australia* echoed the need for more research in this field in a recent editorial which stated that 'Australian general practice has some catching up to do in the area of research performance' and goes on to comment that one determinant of a specialty's standing in the medical community is its performance in research.⁵ Inclusion of a separate chapter on research in the Australian Government publication *General Practice in Australia 2004* indicates the importance of research in this discipline, and this is supported by the substantial Australian Government funding made available for research into general practice.⁶

Two comprehensive reviews of Australian general practice research publications,^{2,3} published between 2000 and 2002, reviewed papers up to 1999. Both of these reviews used manual searches, with one paper also making a comparison between manual and electronic PubMed searches. However, they obtained different numbers of general practice research publications for the same period of analysis (1990–1999). This appeared to be due to the different definitions of research that each author used.

Bibliometric studies are increasingly being used to track publications in different domains of health care,^{7–9} in part to attempt to undertake quality evaluations of published research.¹⁰ We undertook a bibliometric analysis of publications about Australian general practice listed in PubMed from 1980 to 2007. The analysis describes the following: the journals that published these articles, PubMed publication types (letters, editorials, clinical trials, reviews and systematic reviews) and the extent to which national health priority areas are addressed. We also included an analysis of medical informatics publications as a subset of all general practice/primary care publications. We then compared Australian general practice with three special interest areas in medicine in Australia (public health,

cardiology and medical informatics), and with two other countries (the UK and New Zealand) which have similar healthcare systems in which general practice plays a gatekeeper role. Finally, we discuss the possible contribution that research publications have made to the overall growth in our publication output.

Methods

MEDLINE is the largest component of PubMed (pubmed.gov), the freely accessible online database of biomedical journal citations and abstracts created by the US National Library of Medicine (NLM).¹¹ PubMed, which is the public domain interface to MEDLINE provided by the NLM, currently has more than 18 million citations from 5200 journals in 80 countries. To obtain the Australian general practice publications in PubMed we combined two search queries.

The first query retrieved all family/general practice publications in PubMed and the second retrieved publications about Australia (Box 1). By joining the two queries by using the Boolean logic 'AND', we retrieved PubMed publications about Australian general practice. Publications about Australian general practice originating from other countries such as the UK or New Zealand were counted using this method. The methodology reported on in the principal author's previous study¹ was modified to further increase the sensitivity in retrieving publications from Australian general practice. The queries that retrieved National Priority Areas are given in Box 2 and those that retrieved literature from New Zealand and the UK are shown in Box 3.

MEDLINE publications are normally downloaded in a text file format that can be opened using any word processing software such as Windows Notepad or Microsoft Word. Using a software application called PubMed Grabber/Analyzer (PGA),¹² the important fields in the MEDLINE text file were written to a relational database management program in Microsoft Access. The citation fields that we captured were: publication ID (PMID), title (TI), authors (AU), affiliation (AD), date of publication (DP), publication type (PT) and Medical Subject Headings (MeSH).

Online PubMed queries were used to ascertain the number of publications originating from Australia for three other disciplines: one of the oldest disciplines (public health); a very young technology-based discipline (medical informatics); and a clinical discipline (cardiology). We used only MeSH words to obtain these publications as this increased the specificity; we did not attempt to increase the sensitivity as we did for the general practice search. With the general practice

Box 1 PubMed queries used to retrieve Australian general practice, cardiology, public health and medical informatics

PubMed Tags used in queries: [MeSH] – Medical Subject headings, [AD] – Affiliation, [TIAB] – Title/Abstract

Query 1: (retrieves all publications about general/family practice)

('family practice'[MeSH] OR 'family practice'[TIAB] OR 'general practice'[TIAB] OR 'general practitioner*'[TIAB] OR 'family medicine'[TIAB] OR 'family physician*'[TIAB] OR 'family doctor'[TIAB] OR 'family medicine'[AD] OR 'family practice'[AD] OR 'general practice'[AD]) NOT 'General Practice, Dental'[MeSH]

Query 2: (retrieves all publications about Australia)

('Australia'[MeSH] OR Australia[AD] OR Australia[TIAB]) OR ('new south wales'[AD] OR 'NSW'[AD]) OR 'Tasmania'[AD] OR 'ACT'[AD] OR 'Australian Capital Territory'[AD] OR 'Queensland'[AD] OR 'Victoria'[AD] OR ('South Australia'[AD] OR 'SA'[AD]) OR ('Western Australia'[AD] OR 'WA'[AD] OR Northern Territory[AD]) OR NT[AD] OR .au[AD] NOT USA[AD] NOT 'United States'[AD] NOT 'United States of America'[AD] NOT Washington[AD] NOT 'Hong Kong'[AD] NOT Canada[AD]

Query 3:

The two queries above were joined using AND to get the final query which retrieved 'PubMed publications about Australian general/family practice'. With the LIMIT option the period was limited from 1980–01–01 to 2007–12–31.

Query 4: Other specialities

Cardiology – 'Cardiovascular Diseases'[MeSH] OR 'Cardiology'[MeSH]
Public Health – 'Public Health'[MeSH]
Medical Informatics – 'Medical Informatics'[MeSH]

Box 2 PubMed queries used to retrieve national health priority areas**Query 5: National Health Priority Queries**

In retrieving publications for NHPQs we wanted to increase the specificity of the queries and only used MeSH words. We used the top MeSH for each domain.

Asthma – Asthma[MeSH]

Cancer – 'Neoplasms'[MeSH]

Cardiovascular diseases – 'Cardiovascular Diseases'[MeSH]

Mental Health – ('Mental Health'[MeSH] OR 'Mental Health Services'[MeSH] OR 'Community Mental Health Services'[MeSH] OR 'Community Mental Health Centers'[MeSH]) OR 'Mental Disorders'[MeSH]

Diabetes – 'Diabetes Mellitus'[MeSH]

Injury prevention and control – Wounds and Injuries'[MeSH]

Arthritis and musculoskeletal conditions – 'Arthritis'[MeSH] OR 'Musculoskeletal Diseases'[MeSH]

Box 3 PubMed queries used to retrieve UK, New Zealand**Query 6: (retrieves all publications about New Zealand)**

'New Zealand'[MeSH] OR 'New Zealand'[AD] OR 'New Zealand'[Ti]

Query 7: (retrieves all publications from UK)

'Great Britain'[MeSH Terms] OR 'United Kingdom'[AD] OR 'United Kingdom'[Ti] OR 'England'[AD] OR 'Wales'[AD] OR 'Scotland'[AD] OR 'UK'[AD] OR 'U.K.'[AD] OR 'Northern Ireland'[AD] NOT 'New England'[AD] NOT 'New South Wales'[AD]

search we did not want to miss any publications and we therefore increased the sensitivity to the maximum possible, acknowledging that we may have found false positives in the process. All the web sources and PubMed queries were accessed during April 2008.

Results

There were a total of 4777 Australian general practice publications from 1980 to 2007. The publication rate increased from 25 in 1980 to 381 in 2007 (Figure 1). A steady upward trend commenced in the mid-1980s and continued until 2005. There has been a tapering off in publications since 2005, with 434 in that year decreasing to 381 in 2007. The trend seems to be similar in UK publications with a steady increase up to 2000 and a plateauing thereafter.

Australian general practice publications increased 15-fold from 1980 (25) to 2007 (381). The New Zealand publications increased five-fold from 1980 (15) to 2007 (76) and the UK by less than four-fold from 1980 (203) to 2007 (743).

Table 1 compares three specialties: public health, cardiology and medical informatics. Public health publications increased from 684 in 1987 to 7014 in 2005. Medical informatics, with less than ten publications prior to 1985, increased to 374 by 2005, and in 2007 exceeded the number of general practice publications. Commencing at 46 publications in 1980, cardiology maintained a persistently high rate with 1202 publications in 2007.

We were interested in medical informatics as a subset of all publications in general practice. There were 215 (4.5%) medical informatics papers among the 4777 Australian general practice papers. By way of comparison, the UK produced 734 (5%), New

Zealand 51 (4.6%) and the world a total of 2848 (3.9%) of their publications on medical informatics among GP and family practice publications in PubMed.

In terms of number of publications, the top five journals were *Australian Family Physician* (38.1% of the total number), *Medical Journal of Australia* (17.6%), *Australian Journal of Rural Health* (2.7%), *Family Practice* (2.2%) and the *Australian New Zealand Journal of Public Health* (1.9%) (Table 2a). The top ten journals contributed 69.2% of the publications, and the three top journals, *Australian Family Physician*, *Medical Journal of Australia* and the *Australian Journal of Rural Health* together contributed 58.4%. Two rural health journals from Australia contributed 3.6%. The four non-Australian journals among the top ten journals together accounted for 5.4%. The top five journals that published UK general practice papers were the *BMJ* (18.9%), the *British Journal of General Practice* (14.5%), *Family Practice* (4.1%), *Practitioner* (2.8%) and the *Health Services Journal* (2.2%; Table 2b).

The PubMed publication types for Australian general practice from 1983 to 2007, calculated for four-yearly time periods, are given in Table 3a. Review articles have had the largest increment (17.5%), followed by clinical trials (5.1 to 6.6%) and systematic reviews (6.3%). There has been a reduction in letters (7.6–4.9%) and editorials (5.1–3.0%). In the UK general practice publication types (Table 3b), clinical trials showed the highest increase (2–15.9%), followed by reviews (1.2–7.8%) and systematic reviews (0–6.2%).

National Health Priority Areas (NHPA) were addressed by 35% of the general practice publications and these instances are listed in Table 4. Compared to the decade from 1980 to 1989, the seven-year period from 2000 to 2007 saw mental health publications increase from 29 to 447, cardiovascular disease publications from 9 to 180 and neoplasm publications from 8 to 183.

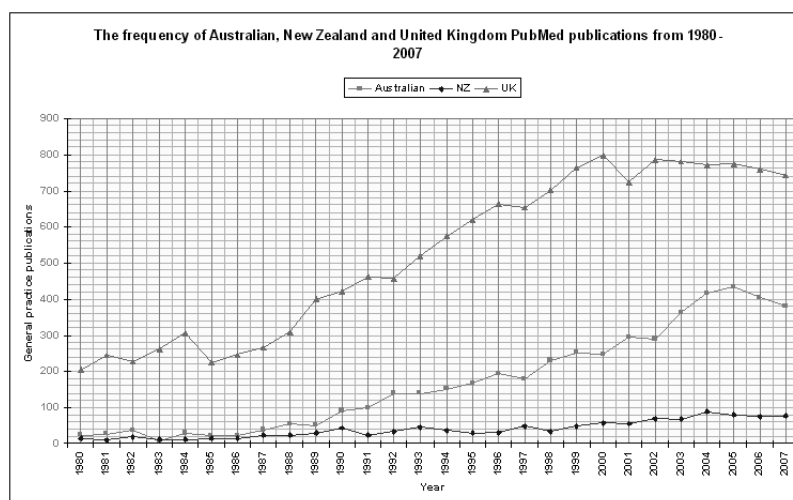


Figure 1 The frequency of Australian, New Zealand and UK general practice publications 1980–2007

Table 1 Frequency of Australian PubMed publications in general practice, public health, medical informatics and cardiology 1980–2007

Year	GP	Public health	Medical informatics	Cardiology
1980	25	257	5	46
1981	26	289	1	39
1982	35	291	4	37
1983	8	303	4	33
1984	29	410	4	64
1985	21	347	6	44
1986	21	392	12	55
1987	39	684	9	192
1988	56	1193	29	409
1989	50	1353	29	415
1990	92	1766	37	443
1991	97	1837	48	449
1992	138	2082	54	499
1993	138	2355	74	559
1994	151	2493	64	559
1995	167	2736	69	566
1996	195	2890	83	565
1997	179	3319	117	584
1998	230	3552	129	685
1999	252	3768	151	718
2000	247	4226	154	713
2001	294	4723	175	861
2002	290	5154	188	869
2003	361	5776	260	980
2004	417	6365	329	1013
2005	434	7014	374	1184
2006	404	7928	458	1347
2007	381	7408	471	1202
Total	4777	80 911	3338	15 130

Table 2a Frequency of Australian general practice publications by journals in PubMed 1980–2007

Journal name	GP publications 1980–2007	% of total GP publications 1980–2007
<i>Australian Family Physician</i>	1822	38.1
<i>Medical Journal of Australia</i>	842	17.6
<i>Australian Journal of Rural Health</i>	131	2.7
<i>Family Practice</i>	106	2.2
<i>Australian and New Zealand Journal of Public Health</i>	93	1.9
<i>Australian and New Zealand Journal of Psychiatry</i>	66	1.4
<i>British Medical Journal</i>	62	1.3
<i>Australian Health Review</i>	59	1.2
<i>Medical Education</i>	49	1.0
<i>Rural Remote Health</i>	45	0.9
<i>British Journal of General Practice</i>	42	0.9
<i>Journal of Paediatric and Child Health</i>	32	0.7
<i>Communicable Diseases Intelligence</i>	30	0.6
<i>Australian Journal of Public Health</i>	29	0.6
<i>Australian and New Zealand Journal of Medicine</i>	14	0.3
<i>Others</i>	1355	28.4
Total	4777	100.0

Only journals with more than 10 citations for the period are listed

Table 5 gives a comparison of numbers of papers published by general practitioners in Australia compared to the UK. Australian general practitioners had 19.2 papers published per 1000 practitioners and UK general practitioners 21.5 per 1000.

Discussion

There has been a sustained growth of Australian general practice publications listed in PubMed, particularly from the late 1980s to 2007, amounting to a 15-fold increase in publications. The increase in publications is largely due to the increase of general reviews, systematic reviews and clinical trials. More than 50% of the publications originated from two Australian journals, and 35% of publications addressed NHPAs.

Two comprehensive reviews of Australian general practice research publications were published in 2000 to 2001^{2,3} and one review was updated in 2008.¹³ We have utilised a comprehensive search strategy to increase PubMed queries to the maximum capacity in retrieving general practice publications, including the institutional affiliation tag (AD) that was used by Askew.³ Furthermore, we did not exclude any publication types from our analysis. Even after excluding the three publication types (letters, editorials and reviews) that were removed in Askew's study, we identified 2815 publications for the period 2000–2007, in comparison to 545.¹³

We agree with Askew that 'although research productivity is an indicator of research capacity it is not the only indicator, and it does not provide information on the quality of research'.¹³ The study by Ward² did not examine the quality of research publications. Our analysis looked at total publications as well as a breakdown of various publication types,

Table 2b Frequency of UK general practice publications by journals in PubMed 1980–2007

Journal name	GP publications 1980–2007	% of total GP publications 1980–2007
<i>British Medical Journal</i> (plus <i>Clinical Research Ed.</i>)	2802	18.9
<i>British Journal of General Practice</i> (includes <i>Journal of the Royal College of General Practitioners</i>)	2136	14.5
<i>Family Practice Practitioner</i>	609	4.1
<i>Health Service Journal</i>	419	2.8
<i>Medical Education</i>	325	2.2
<i>Journal of the Royal Society of Medicine</i>	292	2.0
<i>The Lancet</i>	202	1.4
<i>Social Science and Medicine</i>	219	1.5
<i>Journal of Epidemiology and Community Health</i>	150	1.0
<i>Journal of Public Health Medicine</i>	139	0.9
<i>Nursing Times</i>	127	0.9
<i>Postgraduate Medical Journal</i>	104	0.7
<i>Journal of the Royal College of Physicians of London</i>	79	0.5
Others	64	0.4
Total	7111	48.1
	14 788	100.0

Only journals with more than 50 citations for the period are listed

Table 3a The percentage of Australian general practice PubMed publication types from 1983 to 2007 in four-year intervals

Type of publication	1983–1987 (<i>n</i> =118)	1988–1992 (<i>n</i> =433)	1993–1997 (<i>n</i> =830)	1998–2002 (<i>n</i> =1312)	2003–2007 (<i>n</i> =1997)	Total (<i>n</i> =4690)
Letters	7.6	9.7	8.6	6.8	4.9	6.5
Editorials	5.1	4.4	4.0	5.9	3.0	4.1
Reviews	0	6.5	6.1	12.9	17.5	12.6
Clinical trials	5.1	3.5	6.9	7.1	6.6	6.4
Systematic reviews	0	1.1	2.6	6.3	6.3	5.0
Others	82.2	74.8	71.8	61.1	61.7	64.7

All column values are percentages

Table 3b The percentage of UK general practice PubMed publication types 1983–2007 in four-year intervals

Type of publication	1983–1987 (n=1334)	1988–1992 (n=2058)	1993–1997 (n=3052)	1998–2002 (n=3851)	2003–2007 (n=3863)	Total (n=14158)
Letters	4.6	11.2	15.4	8.6	4.1	8.8
Editorials	6.7	7.9	5.3	2.8	2.2	4.3
Reviews	1.2	3.7	5.1	7.9	7.8	6.0
Clinical trials	2	4.9	5.7	10.7	15.9	9.4
Systematic reviews	0	0.4	1.9	5.7	6.2	3.7
Others	85.5	72	66.6	64.4	63.8	67.8

All column values are percentages

Table 4 The percentage of Australian general practice publications addressing National Health Priority Areas 1983–2007 in four-year intervals

National Health Priority Area	1983–1987 (n=118)	1988–1992 (n=433)	1993–1997 (n=830)	1998–2002 (n=1312)	2003–2007 (n=1997)	Total (n=4690)
Asthma	0.8	2.1	2.2	1.8	2.1	2.0
Neoplasms	2.5	5.1	6.1	6.1	7.3	6.4
Cardiovascular diseases	3.4	4.6	5.2	5.0	7.1	5.8
Mental health	7.6	9.9	11.2	12.5	16.5	13.6
Diabetes mellitus	0	0.9	3.3	3.9	3.7	3.3
Wounds and injuries	0	1.8	1.6	1.2	2.5	1.8
Arthritis	1.7	1.8	2.3	2.4	3.0	2.5
Non-NHPAs	83.9	73.7	68.2	67.1	58.2	64.5

All column values are percentages

which gives an indication of the quality of research, at least by study design. The increase in clinical trials, systematic reviews and qualitative research studies from 2000 to 2007 compared to previous years is encouraging (Table 3a). There has also been a considerable improvement in addressing all the NHPAs since 2000, especially with the increasing burden of mental health, neoplasms and cardiovascular health (Table 4).

More than one-third of all Australian general practice papers were published in *Australian Family Physician* (38.1%), the official publication of the Royal Australian College of General Practitioners, followed by the *Medical Journal of Australia* (17.6%). However,

the *BMJ* (18.9%), not the *British Journal of General Practice* (14.5%), published the highest number of UK general practice papers. The two rural health journals in Australia had the third highest number of publications with a total of 3.6%.

When compared with the other three specialties, the difference between general practice and public health publications was particularly large.³ This may be due to the fact that public health is primarily a research-based discipline and few public health doctors, unlike general practitioners, undertake full-time clinical practice. From 2006, medical informatics has overtaken general practice in terms of numbers of publications. The chances of getting an informatics paper into

Table 5 PubMed publications rates for general practitioners in Australia and the UK for 2005

	Australia	UK
Total number of medical practitioners	60 252*	122 987**
Primary care practitioners	22 589*	35 944**
Total PubMed publications	434***	773***
Publications per 1000 practitioners	19.2	21.5

Data sources:

* Australian Institute of Health and Welfare, www.aihw.gov.au/publications/hwl/mlf05/mlf05-xx-all-employed-practitioners.xls

** www.ic.nhs.uk/statistics-and-data-collections/workforce/nhs-staff-numbers/nhs-staff-1999-2009-medical-and-dental

*** From Figure 1

PubMed may be high because medical informatics has more than 80 journals indexed there, compared to about 30 journals indexed for general practice. When compared to a clinical specialty such as cardiology, general practice is behind not only in the total number of publications but also in the proportion of clinical trials. Ward² compared the paucity of clinical trials in Australian general practice to 'mirroring the findings of a review of GP research in the UK in the mid-1990s'. Seven years after Ward,² it is clear that Australian general practice is behind the UK in the percentage of clinical trials published (6.6% as opposed to 15.9%).

Compared to the other two countries where general practitioners have a gatekeeper role, Australia has done well in increasing publications 15-fold, with New Zealand and the UK increasing theirs only five- and four-fold respectively, keeping an almost similar publication rate per 1000 practitioners (Table 5). Considering this increase in PubMed publications, we may hypothesise that Australian general practice is more productive than is generally appreciated, similar to the conclusion that was reached after a comprehensive study of US family medicine research publications for the year 2003.¹⁴

The lack of general practice research identified by the Australian Government¹⁵ seems to contrast with the increasing growth of health and medical research in Australia.¹⁶ Although the annual NHMRC funding doubled to reach \$412 million by 2005,¹⁷ the general practice share was a mere \$3.7 million (0.5%) of the total.

With an average of 4200 non-referred attendances per general practitioner per year, accounting for 14% of the total Australian healthcare bill and 1.2% of Australia's Gross Domestic Product,¹⁸ it is notable that GP produces a comparatively small peer-reviewed publication output, in comparison with the publication rates of physicians, surgeons and public health

physicians.¹³ There is evidence that a considerable amount of the research undertaken in general practice is not published. Until 2003, 59% of successful General Practice Evaluation Program funded projects did not result in a publication.⁶

Limitations

Our analysis could be criticised for being incomplete and potentially missing local work which was not indexed in PubMed. It has been well established that Australia's health and medical research has high international visibility.¹⁹ However, there are no estimates of what percentage of Australian general practice articles are published in MEDLINE. Two previous publications on general practice research which employed bibliometric analyses identified 546² and 229³ publications for the period 1990–1999, and a follow-up study found 539¹³ for 2000–2007. In comparison, excluding letters, editorials and reviews, we identified through PubMed 1170 Australian general practice publications for the 1900–1999 period and 2117 publications for 2000–2007. This confirms that general practice publications are increasing.

A closely related issue is whether all of these publications are 'research publications'. We did not want to classify these publications into 'research' or 'non-research' publications or use other overly subjective search criteria. Nevertheless, the increase of 'clinical trials' and 'systematic reviews' (Table 3a) over the years is a more objective measurement of the quality of publications and contributes to evidence-based practice.

Bibliometric analyses are based on one central assumption, that 'scientists who have to say something important do publish their findings vigorously in the open international journal literature'.²⁰ One problem with international bibliometric studies using

PubMed to analyse a particular specialty is that non-English medical publications are not well indexed.²¹ However, this should not apply to general practice publications from Australia, New Zealand or the UK. We have used the MeSH field and other fields such as 'Title' and 'Abstract' in our queries to increase the sensitivity. False positives may be a problem as our intention was to increase sensitivity and thereby not to miss any general practice publications.

Another problem of retrieving general practice publications from PubMed is 'the lack of consistent terminology'.²² There are specialties such as emergency medicine that also provide 'primary care' and so general practice publications cannot claim exclusive use of the MeSH term 'primary care'.²³ If all general practice authors included 'general practice' or 'family practice' among their key words and also ensured that the title or abstract related to general practice, retrieval of publications in PubMed would be more visible and accurate.²⁴

Hand searching may be the most accurate method for searching the literature.²⁵ However, even the Cochrane Collaboration relies on both electronic and hand searches.²⁶ The UK National Health Service research and development programme advises that 'when planning a review, investigators should consider the type of literature search and the degree of comprehensiveness that are appropriate for the review in question, taking into account budgetary and time constraints'.²⁷ It will become increasingly difficult to keep track of the huge number of publications in print and electronic format using manual methods.

Conclusions

In conclusion, this paper demonstrates that Australian general practice publications have shown an impressive growth in recent years. This may be due to the impact of Australian Government initiatives over the past decade to support a growth in research in primary care in Australia, although it also reflects the increasing maturity of academic general practice. This analysis can assist governments, researchers, policy makers and others concerned with primary care research to target resources so that further developments can be encouraged, supported and monitored.

AUTHORS' CONTRIBUTIONS

KM conceived the study and designed the PubMed queries, generated the stats and drafted the manuscript. MK participated in the design of the study, checked for problems in the results generated and was

involved in the drafting of the manuscript. PS was involved in critically appraising the study methods and reviewing and revising the manuscript. JC was the non-GP who commented on the study design, reviewed the manuscript and funded the study. All authors read and approved the final manuscript.

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CONFLICTS OF INTEREST

None.

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